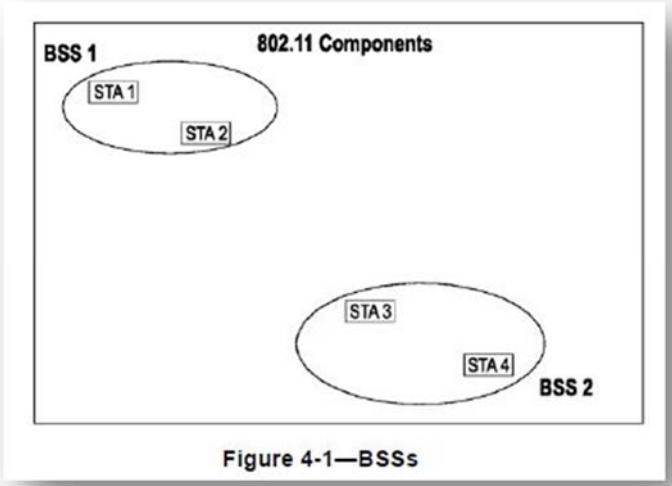
Harris Corporation v. Huawei, et al – Case No. 2:18-cv-439
Plaintiff's Disclosure of Asserted Claims and Infringement Contentions (Pat. L.R. 3-1 & 3-2)
Exhibit D – U.S. Patent No. 7,027,426 ('426) – Claims 1-27

Harris Corporation expressly reserves the right to supplement or modify these Disclosures as appropriate upon receipt of further information and discovery. The Huawei '426 Patent Accused Products (as that term is defined and the corresponding devices are identified in Harris's P.R. 3-1 and P.R. 3-2 disclosures cover pleading) infringe at least the following claims. References to instrumentalities in this chart are exemplary only and should not be construed as limiting the scope of any claim of the '426 patent. The Huawei '426 Patent Accused Products satisfy each claim element below literally. The Huawei '426 Patent Accused Products also satisfy claim elements under the Doctrine of Equivalents, including without limitation where specifically identified below, because they include and perform substantially similar functionality.

All ***bolded italics*** emphasis added unless noted otherwise.

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION
1. A method for operating a mobile ad hoc network comprising a plurality of wireless mobile nodes and a plurality of wireless communication links connecting the plurality of nodes together over a plurality of electrically separate wireless channels, the method comprising:	The Huawei '426 Patent Accused Products infringe this claim. The Huawei '426 Patent Accused Products incorporate a mobile ad hoc network comprising wireless mobile nodes and wireless communication links connecting the nodes together over electrically separate wireless channels. The Huawei '426 Patent Accused Products include the Huawei Wi-Fi Products and the Huawei Zigbee Products. The **Huawei Wi-Fi Products** incorporate a mobile ad hoc network comprising wireless mobile nodes and wireless communication links connecting the nodes together over electrically separate wireless channels. For example, and without limitation: Huawei represents that certain of its products (the Huawei Wi-Fi Products) comply with and communicate according to IEEE 802.11 Wi-Fi standards, including the base 802.11 standard, the IEEE 802.11ac standard, and/or the 802.11s standard. *See, e.g.*, Huawei, Huawei Enterprise AP Series 802.11ac Brochure, at Table 5-1 ("Specifications of Huawei 802.11ac APs"); Huawei, Agile Distributed Wi-Fi Solution, Datasheet, at 2 ("The agile distributed Wi-Fi solution is composed of the central AP (AD9430DN-24 or AD9430DN-12) and remote unit (R250D-E, R250D, R240D, or R230D)."), 10 ("Compliance with IEEE 802.11a/b/g/n/ac"); *see also* Huawei WLAN Products: Indoor Access Points, Outdoor Access Points, and

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	Scenario-specific Product Series webpages, *available at* https://e.huawei.com/us/products/enterprise-networking/wlan (last accessed April 1, 2019). The IEEE 802.11 standards, including the IEEE 802.1ac standard, describe and require a mobile ad hoc network comprising wireless mobile nodes and wireless communication links between the nodes. For example, and without limitation: "In the design of wired LANs it is implicitly assumed that an address is equivalent to a physical location. In wireless networks, this is not always the case. ***In IEEE Std 802.11, the addressable unit is a station (STA)***. The term implies no more than the origin or/and destination of a message. Physical and operational characteristics are defined by modifiers that are placed in front of the term STA. For example, in the case of location and mobility, the addressable units are the fixed STA, the portable STA, and the ***mobile STA***. The STA is a message destination, but not (in general) a fixed location." IEEE Standard for Local and Metropolitan Area Networks – Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications, IEEE Computer Society, IEEE Std 802.11-2012, at p. 44. "The IEEE 802.11 architecture consists of several components that interact to provide a WLAN that supports STA mobility transparently to upper layers. The basic service set (BSS) is the basic building block of an IEEE 802.11 LAN. Figure 4-1 shows two BSSs, each of which has two ***STAs that are members of the BSS***" IEEE Std 802.11-2012, at p. 45.

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	 Figure 4-1—BSSs IEEE Std 802.11-2012, at p. 46, Figure 4-1. "Because this type of IEEE 802.11 LAN is often formed without preplanning, for only as long as the LAN is needed, this type of operation is often referred to as an ***ad hoc network***." IEEE Std 802.11-2012, at p. 46. "The VHT PHY provides support for 20 MHz, 40 MHz, 80 MHz, and 160 MHz contiguous channel widths and support for 80+80 MHz noncontiguous channel width." IEEE Standard for Local and Metropolitan Area Networks – Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications, Amendment 4: Enhancements for Very High

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	Throughput for Operation in Bands below 6 GHz, IEEE Computer Society, IEEE Std 802.11ac-2013, at p. 214. "The services provided to the MAC by the VHT PHY consist of the following protocol functions: a) A function that defines a method of mapping the PSDUs into a framing format (PPDU) suitable for sending and receiving PSDUs between two or more STAs. b) A function that defines the characteristics and method of ***transmitting and receiving data through a wireless medium between two or more STAs***. Depending on the PPDU format, these STAs support a mixture of VHT: Clause 20 and Clause 18 PHYs." IEEE Std 802.11ac-2013, at p. 215. "Mesh point (MP): a mesh-capable node that uses IEEE 802.11 MAC and physical layer protocols for wireless communication. This node supports automatic topology discovery, automatic route discovery, and data packet forwarding." Huawei, Mesh Technology White Paper, Issue 01, May 10, 2013, at 3.

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	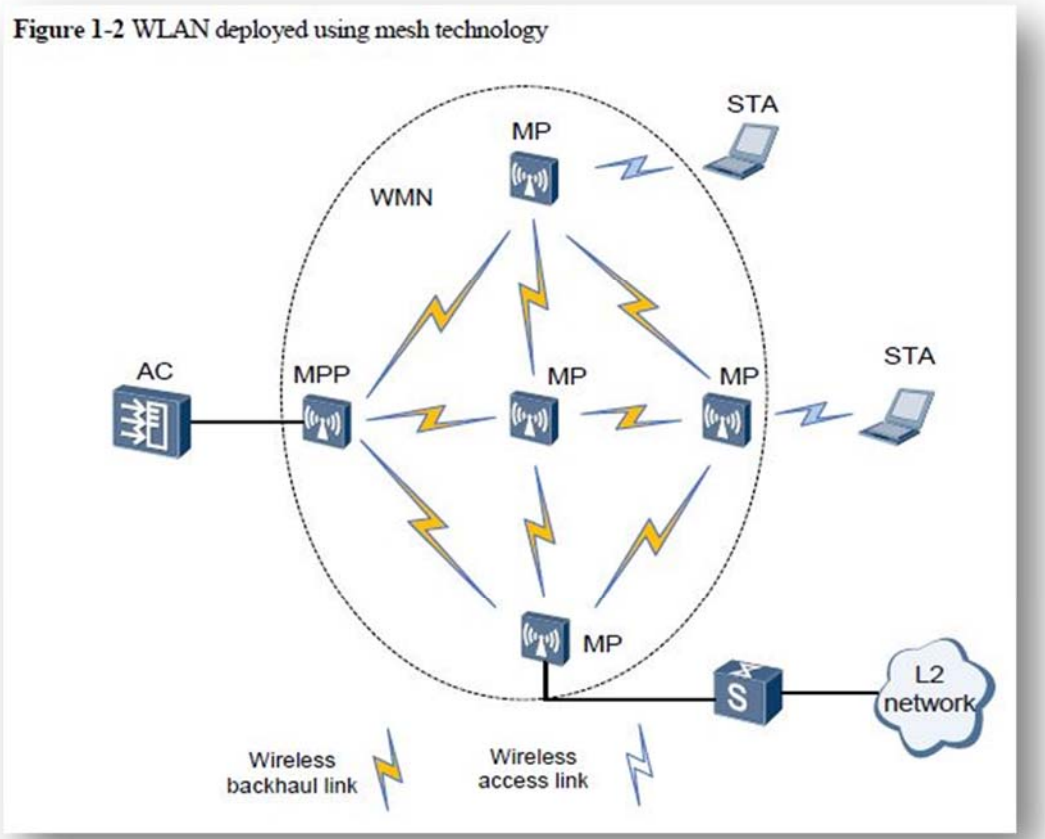 Huawei, Mesh Technology White Paper, Issue 01, May 10, 2013, at 4, Figure 1-2

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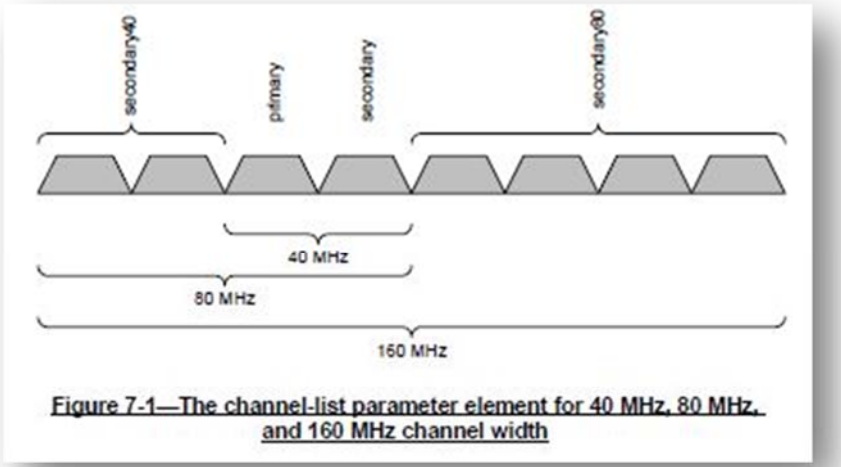
	The IEEE 802.11 standards, including the IEEE 802.1ac standard, describe and require the wireless communication links connect the nodes together over electrically separate wireless channels. For example, and without limitation: "**secondary channel**: A 20 MHz channel associated with a primary channel used by high-throughput (HT) stations (STAs) for the purpose of creating a 40 MHz channel" IEEE Std 802.11-2012, at p. 32. "The channel load request/report pair returns the channel utilization measurement as observed by the measuring STA" IEEE Std 802.11-2012, at p. 54. "Channel usage information is provided by the AP to the non-AP STA to recommend channels for noninfrastructure networks or an off-channel TDLS direct link. The non-AP STAs can use the channel usage information as part of channel selection processing for a noninfrastructure network or an off-channel TDLS direct link" IEEE Std 802.11-2012, at p. 58.

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	 Figure 7-1—The channel-list parameter element for 40 MHz, 80 MHz, and 160 MHz channel width IEEE Std 802.11ac-2013, at p. 31, Figure 7-1. "The AP Channel Report element contains a list of channels in an operating class where a STA is likely to find receive the Beacon or Probe Response frames sent by an AP, excluding the AP transmitting the AP Channel Report." IEEE Std 802.11ac-2013, at p. 181.

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION
	Table 10-19—VHT BSS operating channel width HT Operation element STA Channel Width field / VHT Operation element Channel Width field / BSS operating channel width 0 / 0 / 20 MHz 1 / 0 / 40 MHz 1 / 1 / 80 MHz 1 / 2 / 160 MHz 1 / 3 / 80+80 MHz IEEE Std 802.11ac-2013, at p. 186, Table 10-19

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**

To meet the preceding requirements, the fifth-generation 802.11 standard is developed. The fifth-generation 802.11 standard 802.11ac is an improvement compared with 802.11n. The following table describes the differences between 802.11ac, 802.11n, and 802.11a working in the same frequency band.

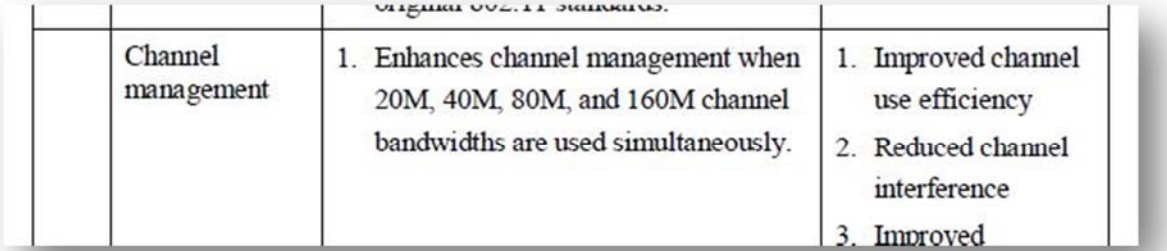
Feature	802.11a	802.11n	802.11ac
Channel width	20 MHz	20 MHz	20/40/80 MHz
		40 MHz (option)	160 and 80+80 MHz (option)
OFDM	Y	Y	Y

Huawei, WLAN 802.11ac Technology White Paper, Version 1.0, April 23, 2014, at 2.

> "At the PHY and MAC address layers, 802.11ac optimizes the channel bandwidth, multi-input multi-output (MIMO), modulation mode and uses new technologies. . . .
>
> In addition to great increase of the maximum throughput, 802.11ac enhances the concurrent user access capability. 802.11ac can transmit data of four users simultaneously. It improves channel management when multiple channel bandwidths are used and enhances compatibility with 802.11a and 802.11n."

Huawei, WLAN 802.11ac Technology White Paper, Version 1.0, April 23, 2014, at 2.

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION



	Channel management	1. Enhances channel management when 20M, 40M, 80M, and 160M channel bandwidths are used simultaneously.	1. Improved channel use efficiency 2. Reduced channel interference 3. Improved

Huawei, WLAN 802.11ac Technology White Paper, Version 1.0, April 23, 2014, at 4.

> "Improves channel probe and feedback modes. 802.11ac sends Null Data Packets (NDPs) to probe channels, and uses feedback with the compressed V matrix."

Huawei, WLAN 802.11ac Technology White Paper, Version 1.0, April 23, 2014, at 5.

> "802.11ac adds 80 MHz and 160 MHz bandwidths. 802.11n supports 20 MHz and 40 MHz bandwidths, where 20 MHz bandwidth is mandatory and 40 MHz bandwidth is optional. 802.11ac supports 20 MHz, 40 MHz, 80 MHz, 80+80 MHz (incontinuous, non-overlapping), and 160 MHz, where 20 MHz, 40 MHz, and 80 MHz bandwidths are mandatory, and 80+80 MHz and 160 MHz bandwidths are optional"

Huawei, WLAN 802.11ac Technology White Paper, Version 1.0, April 23, 2014, at 6.

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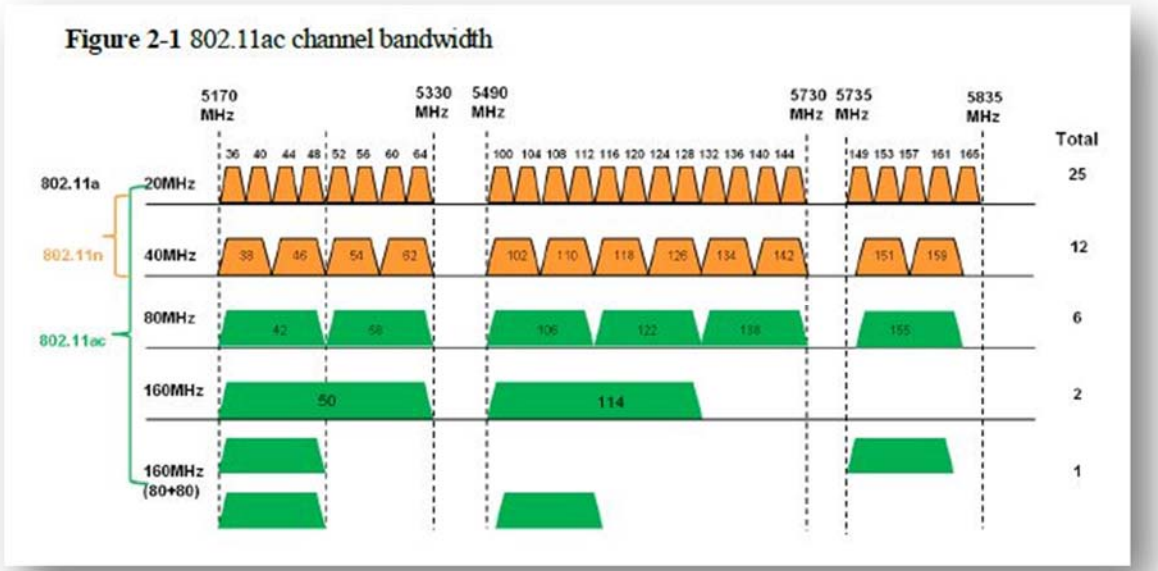
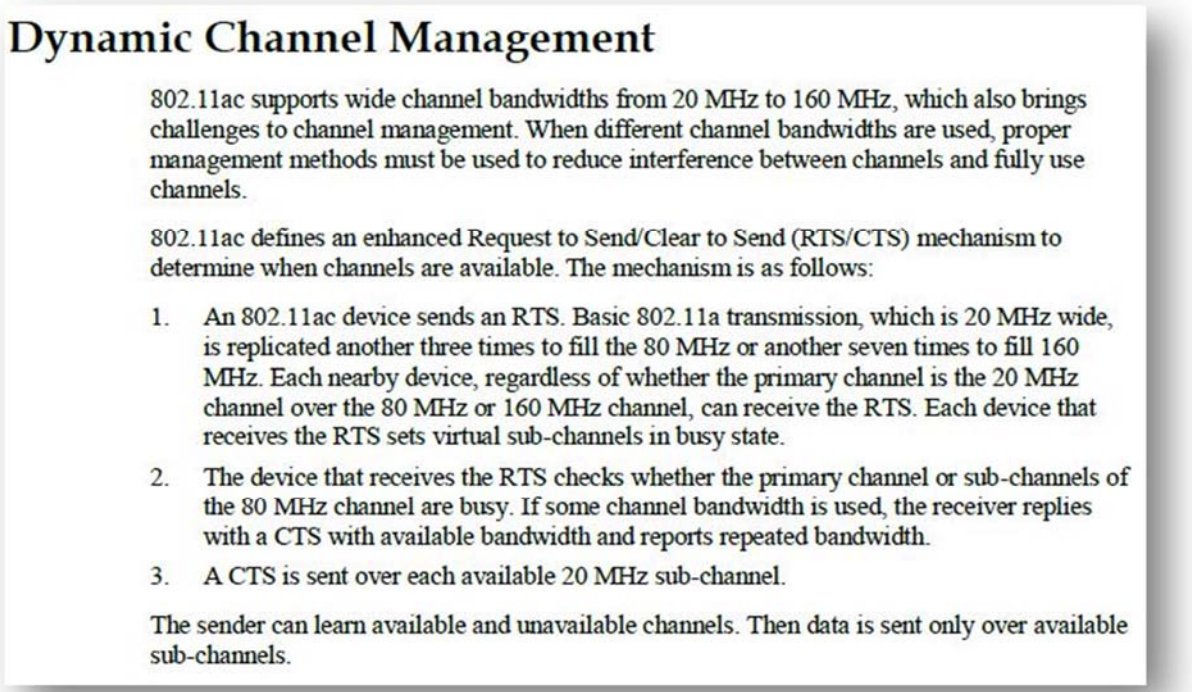
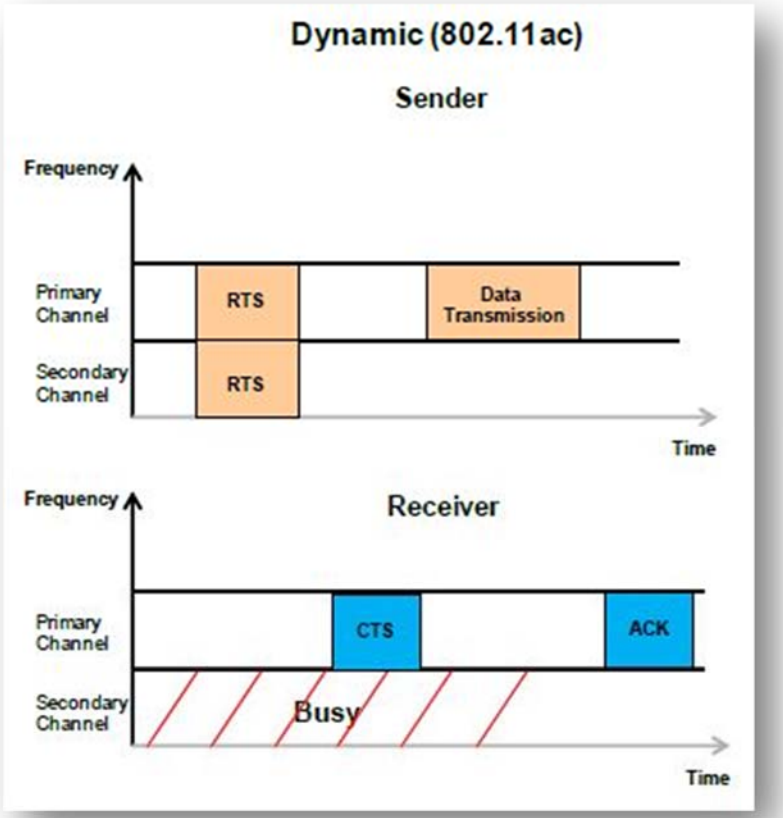
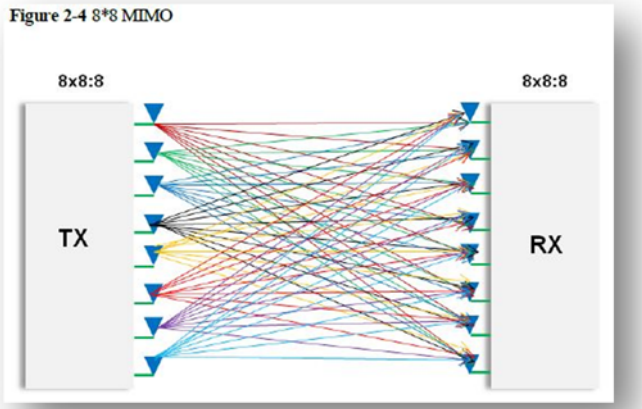
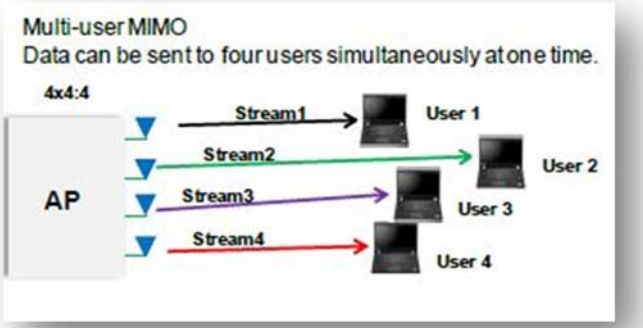
'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION
	 Huawei, WLAN 802.11ac Technology White Paper, Version 1.0, April 23, 2014, at 6, Figure 2-1.

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION
	 Huawei, WLAN 802.11ac Technology White Paper, Version 1.0, April 23, 2014, at 11.

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION
	 Huawei, WLAN 802.11ac Technology White Paper, Version 1.0, April 23, 2014, at 12, Figure 2-7.

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION
	 Huawei, WLAN 802.11ac Technology White Paper, Version 1.0, April 23, 2014, at 10, Figure 2-4. 

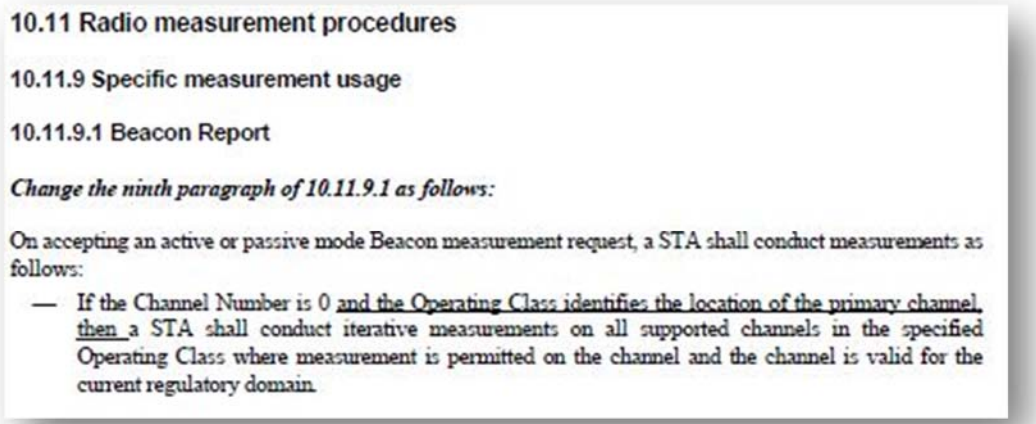
'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	Huawei, WLAN 802.11ac Technology White Paper, Version 1.0, April 23, 2014, at 10, Figure 2-5. "Mesh point (MP): a mesh-capable node that uses IEEE 802.11 MAC and physical layer protocols for wireless communication. This node supports automatic topology discovery, automatic route discovery, and data packet forwarding." Huawei, Mesh Technology White Paper, Issue 01, May 10, 2013, at 3. "Carrier bandwidth is doubled for Huawei 802.11ac APs, with extended channels and more subcarriers for data transmission." Huawei, Huawei Enterprise AP Series 802.11ac Brochure, at 1.
[a] at a source node, sending a route request over each of the plurality of electrically separate channels to discover routing to a destination node;	The Huawei '426 Patent Accused Products incorporate a mobile ad hoc network comprising source nodes that send a route request over each of the plurality of electrically separate channels to discover routing to a destination node. The **Huawei Wi-Fi Products** incorporate a mobile ad hoc network comprising source nodes that send a route request over each of the plurality of electrically separate channels to discover routing to a destination node. For example, and without limitation: The Huawei Wi-Fi Products utilize methods for route discovery described and required by the IEEE 802.11 standards, including by scanning channels and sending messages over each channel to discover channel parameters, availability, and connectivity for routing to a destination node. For example, and without limitation:

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION
	"The Beacon request/report pair ***enables a STA to request from another STA a list of APs whose beacons it can receive on a specified channel or channels***. This measurement may be done by active mode (like active scan), passive mode (like passive scan), or beacon table modes. If the measurement request is accepted and is in passive mode, a duration timer is set. Then the measuring STA monitors the requested channel; measures beacon, probe response, and measurement pilot power levels (received channel power indicator (RCPI)); and logs all beacons, probe responses, and measurement pilots received within the measurement duration. If the measurement request is in active mode, the measuring STA sends a probe request on the requested channel at the beginning of the measurement duration; then monitors the requested channel; measures beacon, probe response, and measurement pilot power levels (RCPI); and logs all beacons, probe responses, and measurement pilots received within the measurement duration. If the request is beacon table mode, then the measuring STA returns a Beacon Report containing the current contents of any stored beacon information for any supported channel with the requested service set identifier (SSID) and basic service set identifier (BSSID) without performing additional measurements." IEEE Std 802.11-2012, at p. 53. "The channel load request/report pair returns the channel utilization measurement as observed by the measuring STA" IEEE Std 802.11-2012, at p. 54. "Channel usage information is provided by the AP to the non-AP STA to recommend channels for noninfrastructure networks or an off-channel TDLS direct link. The non-AP STAs can use the channel usage information as part of channel selection processing for a noninfrastructure network or an off-channel TDLS direct link" IEEE Std 802.11-2012, at p. 58.

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION
	"If a STA accepts a Beacon Request it shall respond with a Radio Measurement Report frame containing Beacon Measurement Reports for all observed BSSs matching the BSSID and SSID in the Beacon Measurement Request, at the level of detail requested in the Reporting Detail." IEEE Std 802.11-2012, at p. 1065. "At the end of the measurement duration, process all received Beacons or Probe Response management frames with the requested SSID and BSSID to compile the measurement report." IEEE Std 802.11-2012, at p. 1065, 1066. "Using the basic access protocol in 9.3.4.2, send a Probe Request management frame to the broadcast destination address (DA). The BSSID field in the Probe Request shall be set to the BSSID field in the measurement request. The SSID element in the Probe Request shall be set to the SSID element in the measurement request." IEEE Std 802.11-2012, at p. 1065.

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION
	On accepting an active or passive mode Beacon measurement request, a STA shall conduct measurements as follows: — If the Channel Number is 0, a STA shall conduct iterative measurements on all supported channels in the specified Operating Class where the measurement is permitted on the channel and the channel is valid for the current regulatory domain. — If the Channel Number is 255 and includes AP Channel Report subelements, a STA shall conduct iterative measurements on all supported channels listed in the AP Channel Report subelements that are valid for the current regulatory domain. If there is no AP Channel Report subelement included in the Beacon Report request, a STA shall conduct iterative measurements on all supported channels listed in the latest AP Channel Report received from the serving AP that are valid for the current regulatory domain. If there are no AP Channel Report subelements included in the Beacon Request, and no AP Channel Report included in last received AP Beacon frame, the STA shall reject the Beacon Report request. — If the Channel Number is a value other than 0 or 255, a STA shall conduct iterative measurements on that Channel Number, where the measurement is permitted on the channel and the channel is valid for the current regulatory domain. IEEE Std 802.11-2012, at p. 1066.

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**



10.11 Radio measurement procedures

10.11.9 Specific measurement usage

10.11.9.1 Beacon Report

Change the ninth paragraph of 10.11.9.1 as follows:

On accepting an active or passive mode Beacon measurement request, a STA shall conduct measurements as follows:

— If the Channel Number is 0 and the Operating Class identifies the location of the primary channel, then a STA shall conduct iterative measurements on all supported channels in the specified Operating Class where measurement is permitted on the channel and the channel is valid for the current regulatory domain.

IEEE Std 802.11ac-2013, at p. 179.

> "The AP Channel Report element contains a list of channels in an operating class where a STA is likely to find receive the Beacon or Probe Response frames sent by an AP, excluding the AP transmitting the AP Channel Report."

IEEE Std 802.11ac-2013, at p. 181.

> "Before a STA starts a VHT BSS, the STA shall perform a minimum of dot11VHTOBSSScanCount OBSS scan operations to search for existing BSSs (see 10.39.3).
>
> If an AP or a mesh STA starts a VHT BSS that occupies some or all channels of any existing BSSs, the AP or mesh STA may select a primary channel of the new VHT BSS that is identical to the primary channel of any one of the existing BSSs"

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	IEEE Std 802.11ac-2013, at p. 187. "An OBSS scan operation is a passive or active scan of a set of channels that are potentially affected by VHT BSS operation (see 10.1.4.1). Each channel in the set may be scanned more than once during a single OBSS scan operation. OBSS scans are performed by STAs that start a VHT BSS." IEEE Std 802.11ac-2013, at p. 188. "A STA shall operate in either a Passive Scanning mode or an Active Scanning mode depending on the current value of the ScanMode parameter of the MLME-SCAN.request primitive. . . . Upon receipt of the MLME-SCAN.request primitive, a STA shall perform scanning." IEEE Std 802.11-2012, at p. 977. "If the ScanType parameter indicates a passive scan, the STA shall listen to each channel scanned for no longer than a maximum duration defined by the MaxChannelTime parameter." IEEE Std 802.11-2012, at p. 978.

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION
	10.1.4.3.3 Active scanning procedure Upon receipt of the MLME-SCAN.request primitive with ScanType indicating an active scan, a STA shall use the following procedure: For each channel to be scanned: a) Wait until the ProbeDelay time has expired or a PHYRxStart.indication primitive has been received. b) Perform the Basic Access procedure as defined in 9.3.4.2. c) Send a probe request to the broadcast destination address, with the SSID and BSSID from the MLME-SCAN.request primitive. When the SSID List is present in the MLME-SCAN.request primitive, send one or more probe request frames, each with an SSID indicated in the SSID List and the BSSID from the MLME-SCAN.request primitive. d) Set to 0 and start a ProbeTimer. e) If PHY-CCA.indication (busy) primitive has not been detected before the ProbeTimer reaches MinChannelTime, then set NAV to 0 and scan the next channel, else when ProbeTimer reaches MaxChannelTime, process all received probe responses. f) Set NAV to 0 and scan the next channel. See Figure 10-3. IEEE Std 802.11-2012, at p. 980.

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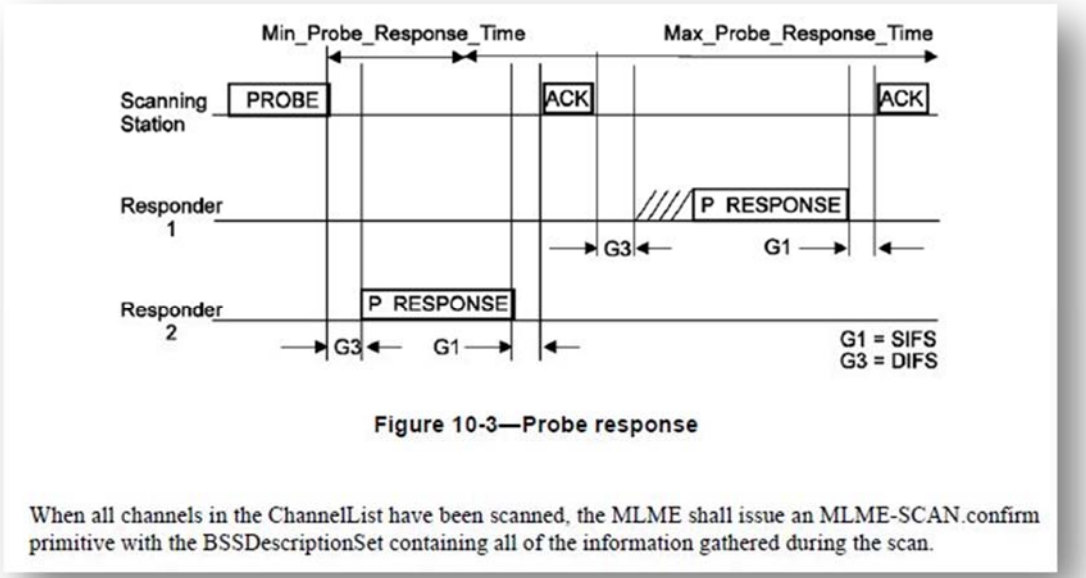


Figure 10-3—Probe response

When all channels in the ChannelList have been scanned, the MLME shall issue an MLME-SCAN.confirm primitive with the BSSDescriptionSet containing all of the information gathered during the scan.

IEEE Std 802.11-2012, at p. 980, Figure 10-3.

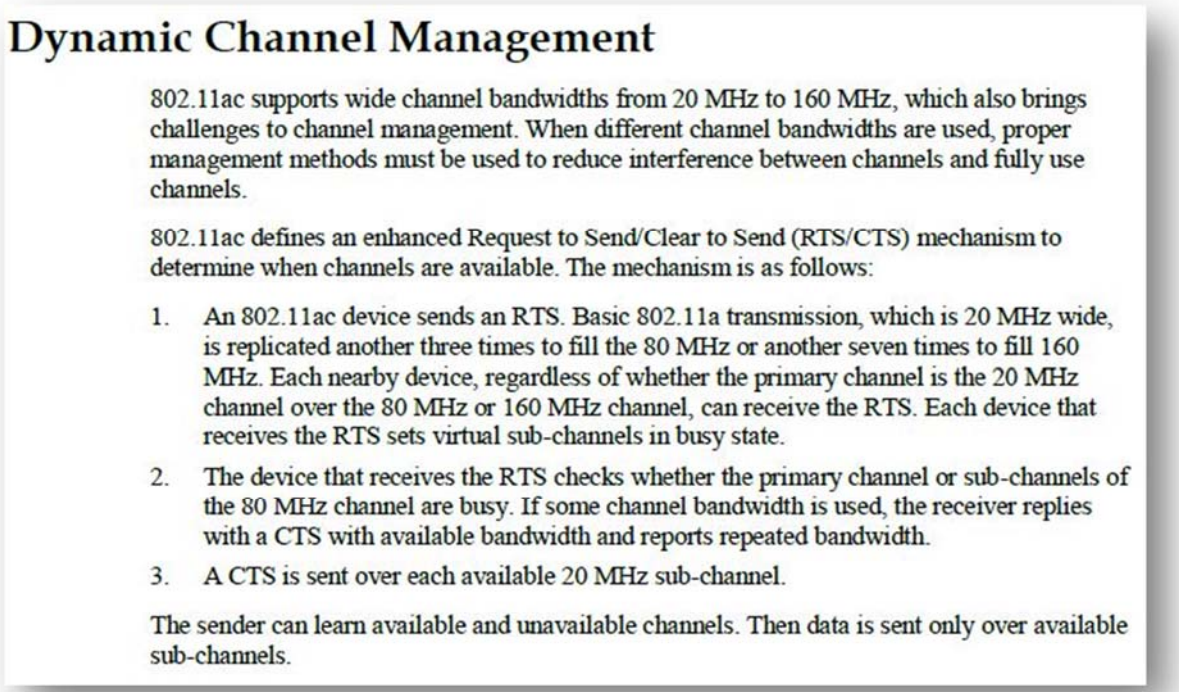
> "Upon receipt of an MLME-START.request primitive, a STA shall determine the BSS's BSSID (as described in 10.1.4), select channel synchronization information, select a beacon period, select the operational rate set, initialize and start its TSF timer, and begin transmitting Beacon frames."

IEEE Std 802.11-2012, at p. 981.

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION

"Improves channel probe and feedback modes. 802.11ac sends Null Data Packets (NDPs) to probe channels, and uses feedback with the compressed V matrix."

Huawei, WLAN 802.11ac Technology White Paper, Version 1.0, April 23, 2014, at 5.



Dynamic Channel Management

802.11ac supports wide channel bandwidths from 20 MHz to 160 MHz, which also brings challenges to channel management. When different channel bandwidths are used, proper management methods must be used to reduce interference between channels and fully use channels.

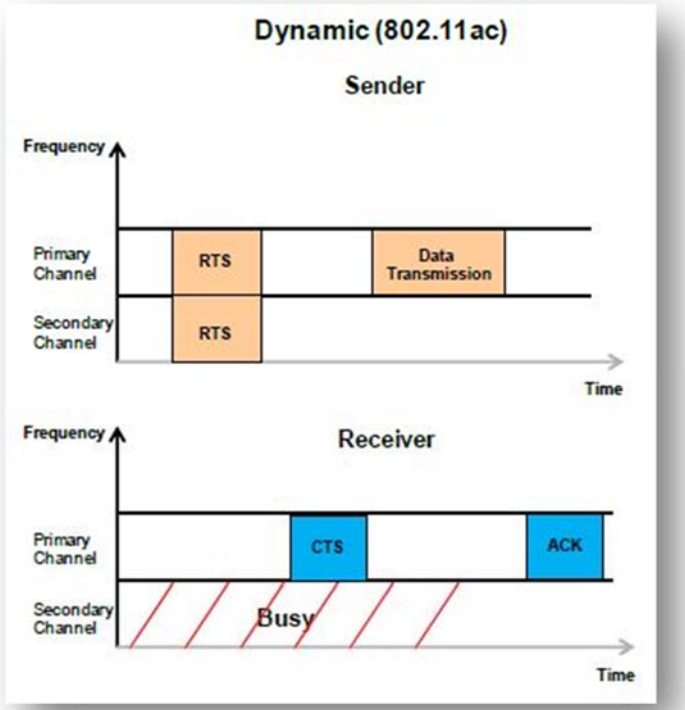
802.11ac defines an enhanced Request to Send/Clear to Send (RTS/CTS) mechanism to determine when channels are available. The mechanism is as follows:

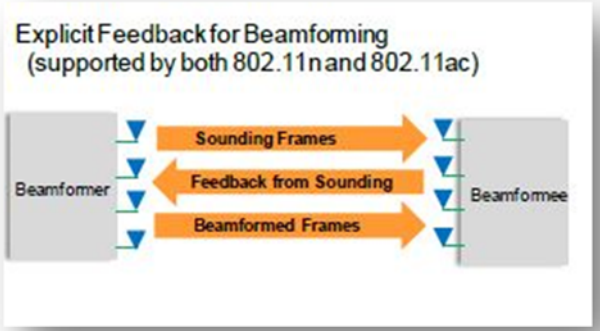
1. An 802.11ac device sends an RTS. Basic 802.11a transmission, which is 20 MHz wide, is replicated another three times to fill the 80 MHz or another seven times to fill 160 MHz. Each nearby device, regardless of whether the primary channel is the 20 MHz channel over the 80 MHz or 160 MHz channel, can receive the RTS. Each device that receives the RTS sets virtual sub-channels in busy state.
2. The device that receives the RTS checks whether the primary channel or sub-channels of the 80 MHz channel are busy. If some channel bandwidth is used, the receiver replies with a CTS with available bandwidth and reports repeated bandwidth.
3. A CTS is sent over each available 20 MHz sub-channel.

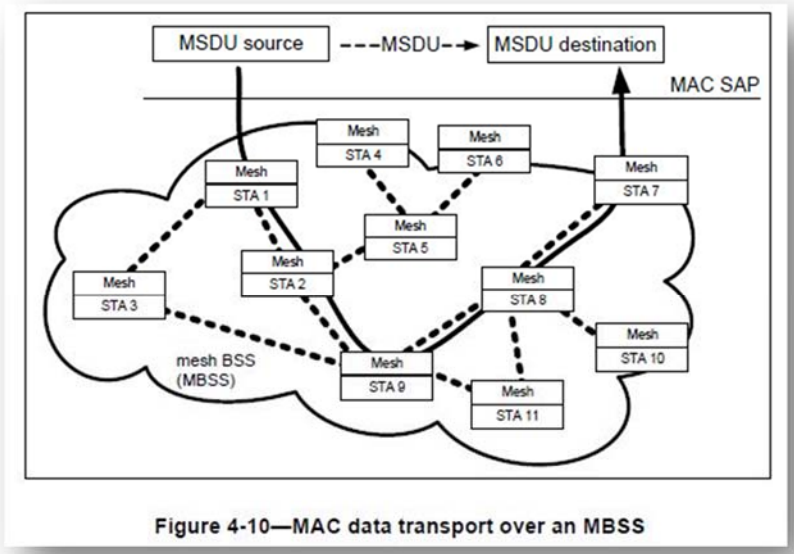
The sender can learn available and unavailable channels. Then data is sent only over available sub-channels.

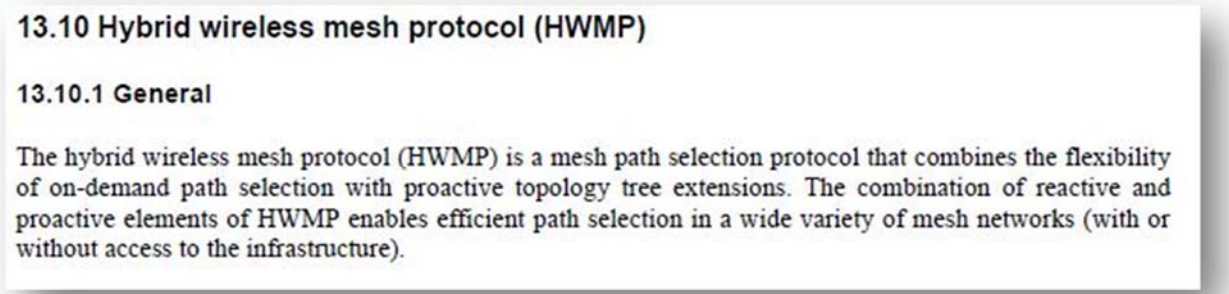
Huawei, WLAN 802.11ac Technology White Paper, Version 1.0, April 23, 2014, at 11.

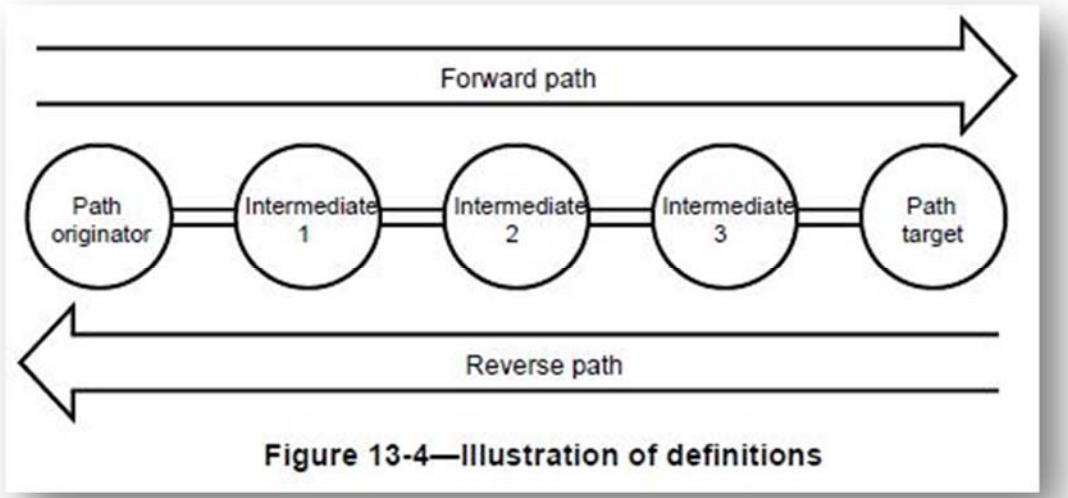
'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	"The RTS/CTS exchange also performs both a type of fast collision inference and a transmission path check. If the return CTS is not detected by the STA originating the RTS, the originating STA may repeat the process (after observing the other medium-use rules) more quickly than if the long data frame had been transmitted and a return ACK frame had not been detected. An RTS/CTS exchange by VHT STAs also performs fast collision inference on the secondary 20 MHz channel, secondary 40 MHz channel, and secondary 80 MHz channel and helps the VHT STA transmitting the RTS to ***determine the available bandwidth at the responder***." IEEE Std 802.11ac-2013, at p. 120; *see also* IEEE Std 802.11-2012, at p. 824. "Another advantage of the RTS/CTS mechanism occurs where multiple BSSs utilizing the same channel overlap. The medium reservation mechanism works across the BSS boundaries" IEEE Std 802.11-2012, at p. 824.

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION
	 Huawei, WLAN 802.11ac Technology White Paper, Version 1.0, April 23, 2014, at 12, Figure 2-7.

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	 Huawei, WLAN 802.11ac Technology White Paper, Version 1.0, April 23, 2014, at 9, Figure 2-1. "Mesh path selection enables ***path discovery over multiple instances of the wireless medium*** within a mesh BSS. The overview of the mesh path selection framework is described in 13.8. The hybrid wireless mesh protocol (HWMP) is defined as the default path selection protocol for the mesh BSS. HWMP provides both proactive path selection and reactive path selection. The details of HWMP are described in 13.10. The path selection protocol uses link metrics in the assessment of a mesh path to the destination." IEEE Std 802.11-2012, at p. 66. "Once the mesh path of a particular pair of the source mesh STA and the destination mesh STA is found through the mesh path selection function, mesh STAs propagate the data by the forwarding function. The details of the forwarding function are described in 9.32." IEEE Std 802.11-2012, at p. 66

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION
	 Figure 4-10—MAC data transport over an MBSS IEEE Std 802.11-2012, at p. 66, Figure 4-10.

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	 IEEE Std 802.11-2012, at p. 1382.

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION
	 Figure 13-4—Illustration of definitions IEEE Std 802.11-2012, at p. 1383. "**forward path**: The forward path is the mesh path to the path target, set up at the path originator and intermediate mesh STAs. **reverse path**: The reverse path is the mesh path to the path originator, set up at the path target and intermediate mesh STAs." IEEE Std 802.11-2012, at p. 1384.

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	"If a source mesh STA needs to find a path to a destination mesh STA using the on-demand path selection mode, it broadcasts a PREQ with the path target specified in the list of targets and the metric field initialized to the initial value of the active path selection metric. When a mesh STA receives a new PREQ, it creates or updates its path information to the originator mesh STA and propagates the PREQ to its neighbor peer mesh STAs if the PREQ contains a greater HWMP SN, or the HWMP SN is the same as the current path and the PREQ offers a better metric than the current path. Each mesh STA may receive multiple copies of the same PREQ that originated at the originator mesh STA, each PREQ traversing a unique path." IEEE Std 802.11-2012, at p. 1385. "Whenever a mesh STA propagates a PREQ, the metric field in the PREQ is updated to reflect the cumulative metric of the path to the originator mesh STA. After creating or updating a path to the originator mesh STA, the target mesh STA sends an individually addressed PREP back to the originator mesh STA. If the mesh STA that received a PREQ is the target mesh STA, it sends an individually addressed PREP back to the originator mesh STA after creating or updating a path to the originator mesh STA." IEEE Std 802.11-2012, at p. 1385. "A WMN saves cables required between mesh nodes while providing path redundancy and rerouting functions as a distributed network. When a new AP is added to a WMN, the AP can automatically connect to the WMN and determine the optimal multi-hop transmission path after being powered on. When a new AP is moved from a WMN, the WMN can ***automatically discover the topology change and adjust communication routes to obtain the optimal transmission path***."

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	Huawei, Mesh Technology White Paper, Issue 01, May 10, 2013, at 2. "Mesh point (MP): a mesh-capable node that uses IEEE 802.11 MAC and physical layer protocols for wireless communication. This node supports ***automatic topology discovery, automatic route discovery***, and data packet forwarding." Huawei, Mesh Technology White Paper, Issue 01, May 10, 2013, at 3.

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION

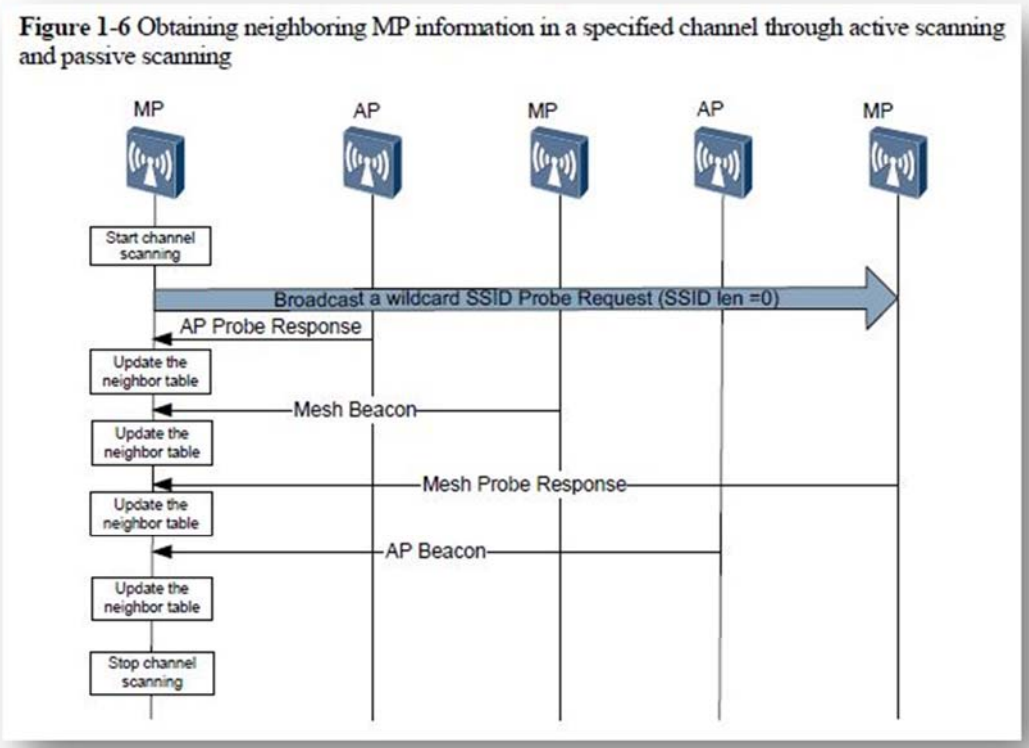


Figure 1-6 Obtaining neighboring MP information in a specified channel through active scanning and passive scanning

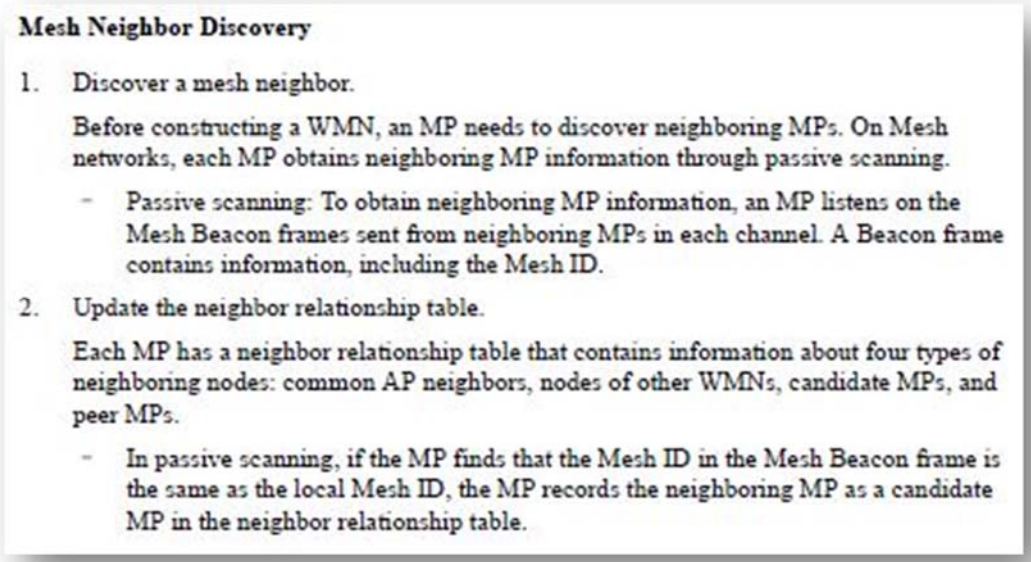
Huawei, Mesh Technology White Paper, Issue 01, May 10, 2013, at 4, Figure 1-6.

"A WMN includes the following devices:

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION

- Mesh point (MP): a mesh-capable node that uses IEEE 802.11 MAC and physical layer protocols for wireless communication. This node supports automatic topology discovery, automatic route discovery, and data packet forwarding. MPs can provide both mesh service and user access service."

Huawei, Configuration Guide – WLAN-AC, at 739.



Mesh Neighbor Discovery

1. Discover a mesh neighbor.

   Before constructing a WMN, an MP needs to discover neighboring MPs. On Mesh networks, each MP obtains neighboring MP information through passive scanning.

   - Passive scanning: To obtain neighboring MP information, an MP listens on the Mesh Beacon frames sent from neighboring MPs in each channel. A Beacon frame contains information, including the Mesh ID.

2. Update the neighbor relationship table.

   Each MP has a neighbor relationship table that contains information about four types of neighboring nodes: common AP neighbors, nodes of other WMNs, candidate MPs, and peer MPs.

   - In passive scanning, if the MP finds that the Mesh ID in the Mesh Beacon frame is the same as the local Mesh ID, the MP records the neighboring MP as a candidate MP in the neighbor relationship table.

Huawei, Configuration Guide – WLAN-AC, at 739.

"WLAN channel management and channel rate adjustment

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	Automatic channel scanning and interference avoidance" Huawei, Agile Distributed Wi-Fi Solution, Datasheet, at 10. "Carrier bandwidth is doubled for Huawei 802.11ac APs, with extended channels and more subcarriers for data transmission." Huawei, Huawei Enterprise AP Series 802.11ac Brochure, at 1. "Huawei applies innovative technologies to WLAN products, including dynamic power adjustment, channel optimization, 5-G prior, and dynamic load balancing, which enables wireless networks to be deployed rapidly and automatically adjusts to network changes in real time, improving network running efficiency and radio performance. Interference suppression technologies, such as Clear Channel Assessment (CCA), rogue device detection, and radio calibration dynamically detect and minimize interference in the radio environment, creating a clean radio experience." Huawei, Huawei Enterprise AP Series 802.11ac Brochure, at 6. "Automatic radio calibration allows an AP to ***collect signal strength and channel parameters of surrounding APs and generate AP topology according to the collected data***. Based on interference from authorized APs, rogue APs, and non-Wi-Fi interference sources, each AP automatically adjusts its transmit power and working channel to make the network operate at the optimal performance. In this way, network reliability and user experience are improved." Huawei, AP4051DN & AP4151DN Access Points, Datasheet, at 3; *see also* Huawei, AP8050DN & AP8150DN Access Points, Datasheet, at 3; Huawei, AP2030DN Access Point, Datasheet, at 2; Huawei, AP4050DN-E Access Point, Datasheet, at 3.

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
[b] at each intermediate node, determining whether the intermediate node can support the route requested and, if so, forwarding the route request to other intermediate nodes and the destination node over each of the plurality of electrically separate channels;	The Huawei '426 Patent Accused Products incorporate a mobile ad hoc network comprising intermediate nodes that determine whether the intermediate node can support the route requested and, if so, forward the route request to other intermediate nodes and the destination node over each of the electrically separate channels. The **Huawei Wi-Fi Products** incorporate a mobile ad hoc network comprising intermediate nodes that determine whether the intermediate node can support the route requested and, if so, forward the route request to other intermediate nodes and the destination node over each of the electrically separate channels. For example, and without limitation: The Huawei Wi-Fi Products utilize methods for route discovery described and required by the IEEE 802.11 standards, including by scanning channels and sending messages over each channel to discover channel parameters, availability, and connectivity for routing to a destination node. The nodes forward route discovery requests and replies to other nodes. For example, and without limitation: *See* claim element 1[a] above. "Once the mesh path of a particular pair of the source mesh STA and the destination mesh STA is found through the mesh path selection function, mesh STAs propagate the data by the forwarding function. The details of the forwarding function are described in 9.32." IEEE Std 802.11-2012, at p. 66. "Forwarding information is created by the active mesh path selection protocol and is utilized for MSDU/MMPDU forwarding as described in 9.32.4 and 9.32.6.2. The basic forwarding information to a destination mesh STA consists of the destination mesh STA address, the next-hop address, the precursor list, and the lifetime of this forwarding information."

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	IEEE Std 802.11-2012, at p. 964. "The active path selection protocol may define additional parameters in the forwarding information. Details on the additional parameters of the forwarding information constructed by the hybrid wireless mesh protocol (HWMP) are described in 13.10.8.4." IEEE Std 802.11-2012, at p. 964. "If a source mesh STA needs to find a path to a destination mesh STA using the on-demand path selection mode, it broadcasts a PREQ with the path target specified in the list of targets and the metric field initialized to the initial value of the active path selection metric. When a mesh STA receives a new PREQ, it creates or updates its path information to the originator mesh STA and ***propagates the PREQ to its neighbor peer mesh STAs*** if the PREQ contains a greater HWMP SN, or the HWMP SN is the same as the current path and the PREQ offers a better metric than the current path. Each mesh STA may receive multiple copies of the same PREQ that originated at the originator mesh STA, each PREQ traversing a unique path." IEEE Std 802.11-2012, at p. 1385. "Whenever a mesh STA propagates a PREQ, the metric field in the PREQ is updated to reflect the cumulative metric of the path to the originator mesh STA. After creating or updating a path to the originator mesh STA, the target mesh STA sends an individually addressed PREP back to the originator mesh STA. If the mesh STA that received a PREQ is the target mesh STA, it sends an individually addressed PREP back to the originator mesh STA after creating or updating a path to the originator mesh STA."

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION
	IEEE Std 802.11-2012, at p. 1385. **13.10.8.4 Forwarding information** In addition to the parameters contained in the basic forwarding information as described in 9.32.2, the forwarding information to a destination defined by HWMP also contains at least the destination HWMP SN, the path metric, and the number of hops. PREQ elements and PREP elements create or update the forwarding information of the mesh STAs that process these elements as follows: — The mesh STA may create or update its forwarding information to the transmitter of the element if the path metric improves. — The mesh STA shall create or update its forwarding information to the originator mesh STA, if it received a PREQ, and one of the following conditions is met: — The Originator HWMP SN > HWMP SN in the forwarding information for this originator mesh STA, or — The Originator HWMP SN = HWMP SN in the forwarding information for this originator mesh STA AND the updated path metric is better than the path metric in the forwarding information. — The mesh STA shall create or update its forwarding information to the target mesh STA, if it received a PREP, and one of the following conditions is met: — The Target HWMP SN > HWMP SN in the forwarding information for this target mesh STA, or — The Target HWMP SN = HWMP SN in the forwarding information for this target mesh STA AND the updated path metric is better than the path metric in the forwarding information. IEEE Std 802.11-2012, at p. 1390.

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	"Mesh point (MP): a mesh-capable node that uses IEEE 802.11 MAC and physical layer protocols for wireless communication. This node supports automatic topology discovery, automatic route ***discovery***, and data packet forwarding." Huawei, Mesh Technology White Paper, Issue 01, May 10, 2013, at 3. "A WMN includes the following devices: • Mesh point (MP): a mesh-capable node that uses IEEE 802.11 MAC and physical layer protocols for wireless communication. This node supports automatic topology discovery, automatic route discovery, and data packet forwarding. MPs can provide both mesh service and user access service." Huawei, Configuration Guide – WLAN-AC, at 739.
[c] at the destination node, upon receiving the route request, generating a reply to the source node for each discovered route;	The Huawei '426 Patent Accused Products incorporate a mobile ad hoc network comprising destination nodes that, upon receiving the route request, generate a reply to the source node for each discovered route. The **Huawei Wi-Fi Products** incorporate a mobile ad hoc network comprising destination nodes that, upon receiving the route request, generate a reply to the source node for each discovered route. For example, and without limitation: The Huawei Wi-Fi Products utilize methods for route discovery described and required by the IEEE 802.11 standards, including by scanning channels and sending messages over each channel to discover channel parameters, availability, and connectivity for routing to a destination node. The nodes generate replies to the source node with information about discovered routes. For example, and without limitation: *See* claim element 1[a] above.

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	"The Beacon request/***report*** pair enables a STA to request from another STA a list of APs whose beacons it can receive on a specified channel or channels. This measurement may be done by active mode (like active scan), passive mode (like passive scan), or beacon table modes. If the measurement request is accepted and is in passive mode, a duration timer is set. Then the measuring STA monitors the requested channel; ***measures beacon, probe response, and measurement pilot power levels (received channel power indicator (RCPI)); and logs all beacons, probe responses, and measurement pilots received within the measurement duration***. If the measurement request is in active mode, the measuring STA sends a probe request on the requested channel at the beginning of the measurement duration; then monitors the requested channel; measures beacon, probe response, and measurement pilot power levels (RCPI); and logs all beacons, probe responses, and measurement pilots received within the measurement duration. If the request is beacon table mode, then the measuring STA returns a Beacon Report containing the current contents of any stored beacon information for any supported channel with the requested service set identifier (SSID) and basic service set identifier (BSSID) without performing additional measurements." IEEE Std 802.11-2012, at p. 53. "The channel load request/***report*** pair returns the channel utilization measurement as observed by the measuring STA" IEEE Std 802.11-2012, at p. 54. "Channel usage information is provided by the AP to the non-AP STA to recommend channels for noninfrastructure networks or an off-channel TDLS direct link. The non-AP STAs can use the channel usage information as part of channel selection processing for a noninfrastructure network or an off-channel TDLS direct link." IEEE Std 802.11-2012, at p. 58.

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION

"If a STA accepts a Beacon Request it shall respond with a Radio Measurement Report frame containing Beacon Measurement Reports for all observed BSSs matching the BSSID and SSID in the Beacon Measurement Request, at the level of detail requested in the Reporting Detail."

IEEE Std 802.11-2012, at p. 1065.

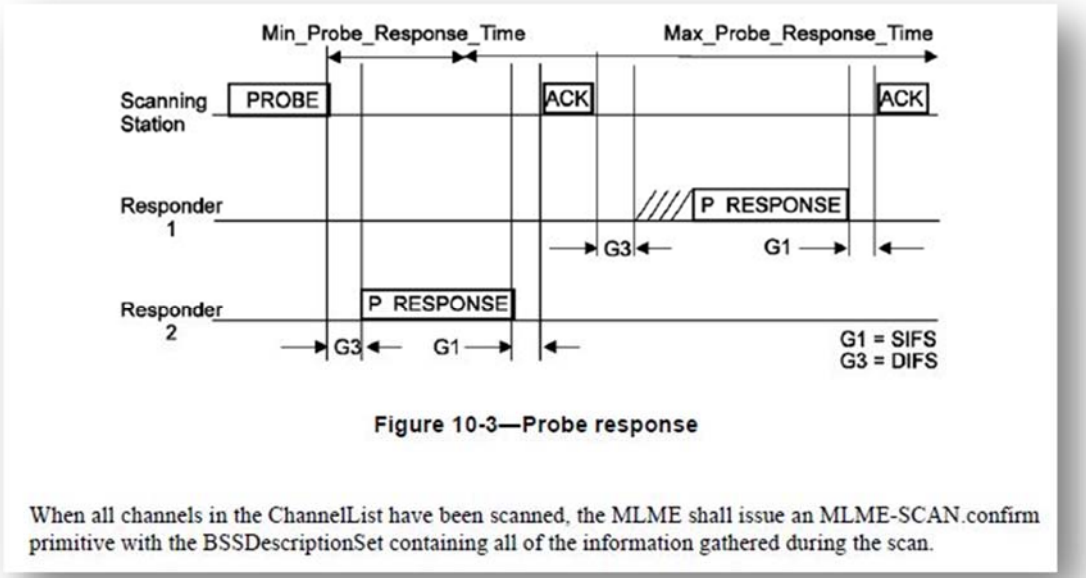
"At the end of the measurement duration, process all received Beacons or Probe Response management frames with the requested SSID and BSSID to compile the measurement report."

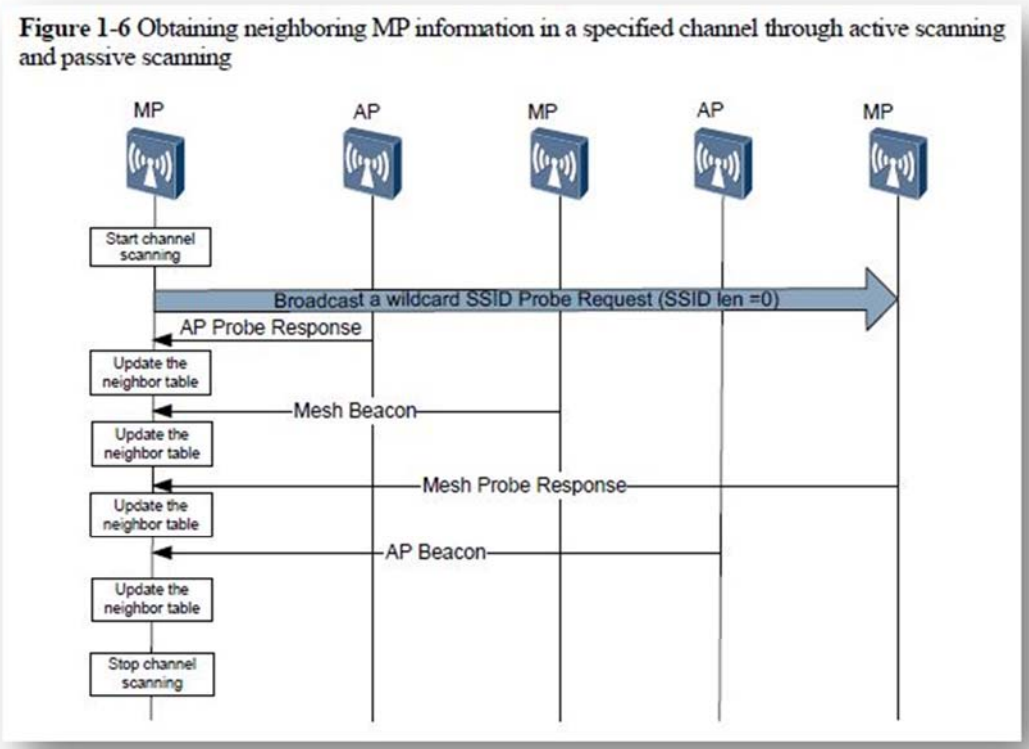
IEEE Std 802.11-2012, at p. 1065, 1066.

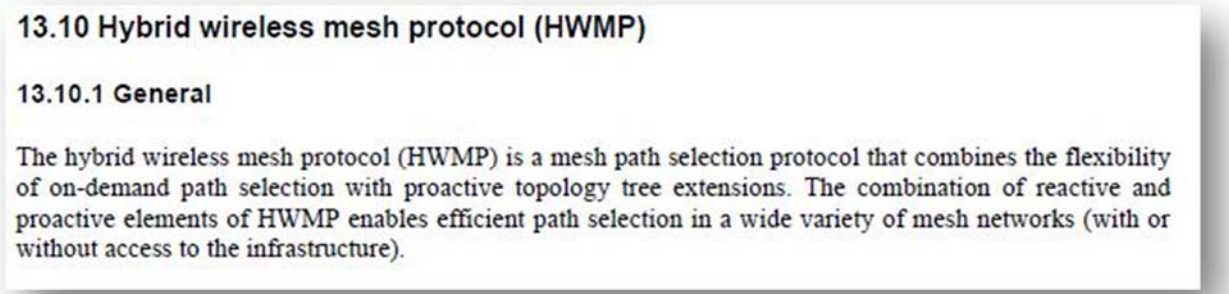
On accepting an active or passive mode Beacon measurement request, a STA shall conduct measurements as follows:

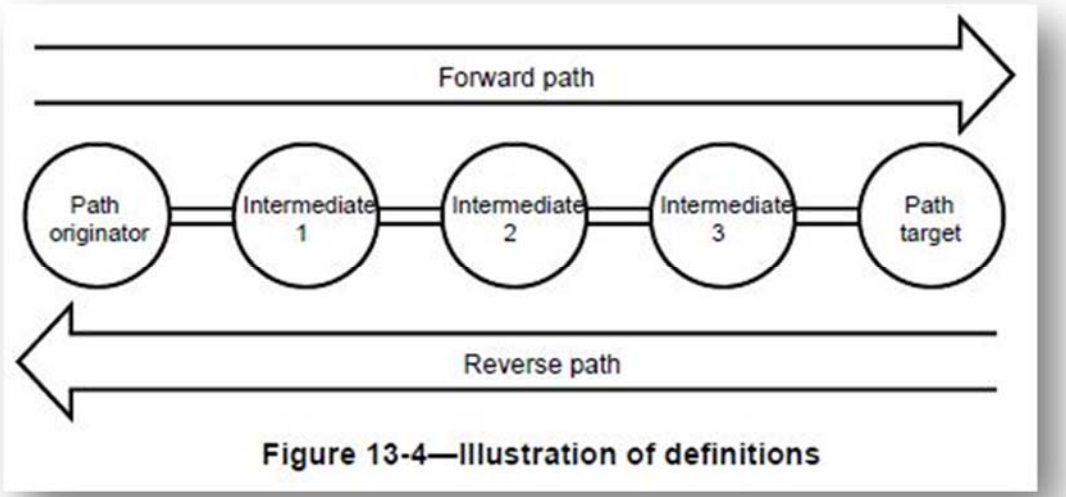
- If the Channel Number is 0, a STA shall conduct iterative measurements on all supported channels in the specified Operating Class where the measurement is permitted on the channel and the channel is valid for the current regulatory domain.
- If the Channel Number is 255 and includes AP Channel Report subelements, a STA shall conduct iterative measurements on all supported channels listed in the AP Channel Report subelements that are valid for the current regulatory domain. If there is no AP Channel Report subelement included in the Beacon Report request, a STA shall conduct iterative measurements on all supported channels listed in the latest AP Channel Report received from the serving AP that are valid for the current regulatory domain. If there are no AP Channel Report subelements included in the Beacon Request, and no AP Channel Report included in last received AP Beacon frame, the STA shall reject the Beacon Report request.
- If the Channel Number is a value other than 0 or 255, a STA shall conduct iterative measurements on that Channel Number, where the measurement is permitted on the channel and the channel is valid for the current regulatory domain.

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	IEEE Std 802.11-2012, at p. 1066. **10.11 Radio measurement procedures** **10.11.9 Specific measurement usage** **10.11.9.1 Beacon Report** ***Change the ninth paragraph of 10.11.9.1 as follows:*** On accepting an active or passive mode Beacon measurement request, a STA shall conduct measurements as follows: — If the Channel Number is 0 and the Operating Class identifies the location of the primary channel, then a STA shall conduct iterative measurements on all supported channels in the specified Operating Class where measurement is permitted on the channel and the channel is valid for the current regulatory domain. IEEE Std 802.11ac-2013, at p. 179. "The AP Channel Report element contains a list of channels in an operating class where a STA is likely to find receive the Beacon or Probe Response frames sent by an AP, excluding the AP transmitting the AP Channel Report."

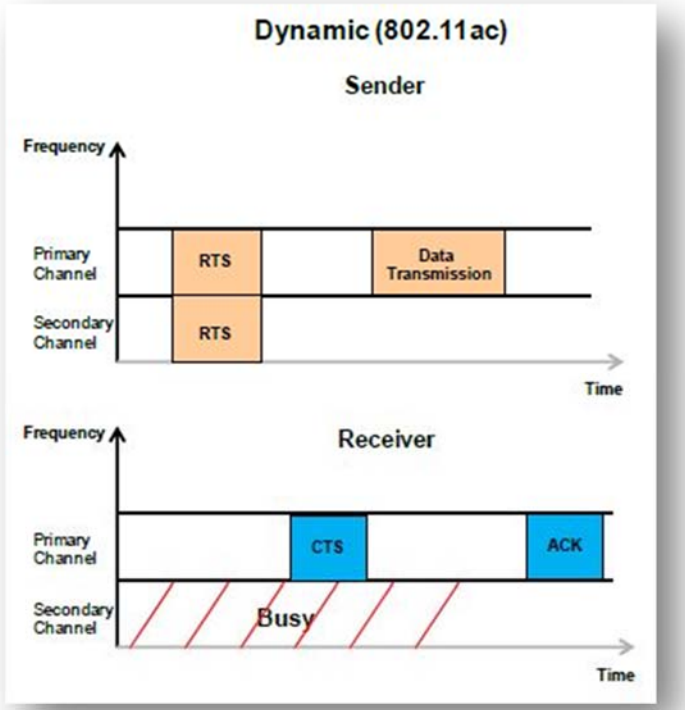
'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION
	 Figure 10-3—Probe response When all channels in the ChannelList have been scanned, the MLME shall issue an MLME-SCAN.confirm primitive with the BSSDescriptionSet containing all of the information gathered during the scan. IEEE Std 802.11-2012, at p. 980, Figure 10-3.

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION
	 Huawei, Mesh Technology White Paper, Issue 01, May 10, 2013, at 4, Figure 1-6.

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	 13.10 Hybrid wireless mesh protocol (HWMP) 13.10.1 General The hybrid wireless mesh protocol (HWMP) is a mesh path selection protocol that combines the flexibility of on-demand path selection with proactive topology tree extensions. The combination of reactive and proactive elements of HWMP enables efficient path selection in a wide variety of mesh networks (with or without access to the infrastructure). IEEE Std 802.11-2012, at p. 1382.

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION
	 Figure 13-4—Illustration of definitions IEEE Std 802.11-2012, at p. 1383. "reverse path: The reverse path is the mesh path to the path originator, set up at the path target and intermediate mesh STAs." IEEE Std 802.11-2012, at p. 1384. "Whenever a mesh STA propagates a PREQ, the metric field in the PREQ is updated to reflect the cumulative metric of the path to the originator mesh STA. After creating or updating a path to the originator mesh STA, the target mesh STA sends an individually addressed PREP back to the originator mesh STA.

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	If the mesh STA that received a PREQ is the target mesh STA, it sends an individually addressed PREP back to the originator mesh STA after creating or updating a path to the originator mesh STA." IEEE Std 802.11-2012, at p. 1385. "Improves channel probe and feedback modes. 802.11ac sends Null Data Packets (NDPs) to probe channels, and uses feedback with the compressed V matrix." Huawei, WLAN 802.11ac Technology White Paper, Version 1.0, April 23, 2014, at 5.

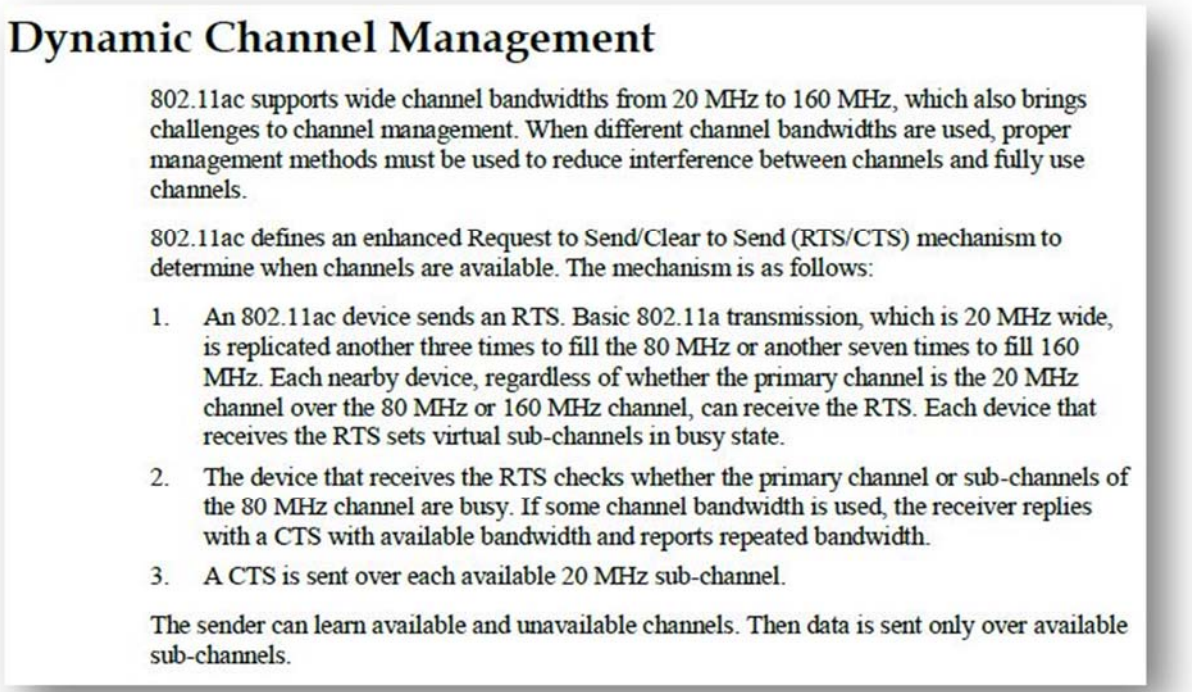
'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION
	 Huawei, WLAN 802.11ac Technology White Paper, Version 1.0, April 23, 2014, at 12, Figure 2-7.

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
[d] at the source node, selecting a route to the destination node on at least one of the plurality of electrically separate channels; and	The Huawei '426 Patent Accused Products incorporate a mobile ad hoc network comprising source nodes that select a route to the destination node on at least one of the plurality of electrically separate channels. For example, and without limitation: The **Huawei Wi-Fi Products** incorporate a mobile ad hoc network comprising source nodes that select a route to the destination node on at least one of the plurality of electrically separate channels. For example, and without limitation: As described above with respect to claim element 1[a], the Huawei Wi-Fi Products utilize methods for route discovery described and required by the IEEE 802.11 standards, including by scanning channels and sending messages over each channel to discover channel parameters, availability, and connectivity for routing to a destination node. Those standards also describe and require selection of a route using that information, including selection of at least one of the electrically separate channels between each source and destination node. For example, and without limitation: "The Beacon request/report pair ***enables a STA to request from another STA a list of APs whose beacons it can receive on a specified channel or channels***. This measurement may be done by active mode (like active scan), passive mode (like passive scan), or beacon table modes. If the measurement request is accepted and is in passive mode, a duration timer is set. ***Then the measuring STA monitors the requested channel; measures beacon, probe response, and measurement pilot power levels (received channel power indicator (RCPI)); and logs all beacons, probe responses, and measurement pilots received within the measurement duration***. If the measurement request is in active mode, the measuring STA sends a probe request on the requested channel at the beginning of the measurement duration; then monitors the requested channel; measures beacon, probe response, and measurement pilot power levels (RCPI); and logs all beacons, probe responses, and measurement pilots received within the measurement duration. If the request is beacon table mode, then the measuring STA returns a Beacon Report containing the current contents of any stored beacon information for any supported channel with the requested

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	service set identifier (SSID) and basic service set identifier (BSSID) without performing additional measurements." IEEE Std 802.11-2012, at p. 53. "The channel load request/report pair returns the channel utilization measurement as observed by the measuring STA" IEEE Std 802.11-2012, at p. 54. "Channel usage information is provided by the AP to the non-AP STA to recommend channels for noninfrastructure networks or an off-channel TDLS direct link. The non-AP STAs can use the channel usage information as part of ***channel selection processing*** for a noninfrastructure network or an off-channel TDLS direct link." IEEE Std 802.11-2012, at p. 58. "If a STA accepts a Beacon Request it shall respond with a Radio Measurement Report frame containing ***Beacon Measurement Reports for all observed BSSs matching the BSSID and SSID in the Beacon Measurement Request***, at the level of detail requested in the Reporting Detail." IEEE Std 802.11-2012, at p. 1065. "At the end of the measurement duration, ***process all received Beacons or Probe Response management frames with the requested SSID and BSSID to compile the measurement report***." IEEE Std 802.11-2012, at p. 1065, 1066.

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	"The AP Channel Report element contains a list of channels in an operating class where a STA is likely to find receive the Beacon or Probe Response frames sent by an AP, excluding the AP transmitting the AP Channel Report." IEEE Std 802.11ac-2013, at p. 181. "Upon receipt of an MLME-START.request primitive, a STA shall determine the BSS's BSSID (as described in 10.1.4), ***select channel synchronization information***, select a beacon period, select the operational rate set, initialize and start its TSF timer, and begin transmitting Beacon frames." IEEE Std 802.11-2012, at p. 981. "Improves channel probe and feedback modes. 802.11ac sends Null Data Packets (NDPs) to probe channels, and uses feedback with the compressed V matrix." Huawei, WLAN 802.11ac Technology White Paper, Version 1.0, April 23, 2014, at 5.

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION



Dynamic Channel Management

802.11ac supports wide channel bandwidths from 20 MHz to 160 MHz, which also brings challenges to channel management. When different channel bandwidths are used, proper management methods must be used to reduce interference between channels and fully use channels.

802.11ac defines an enhanced Request to Send/Clear to Send (RTS/CTS) mechanism to determine when channels are available. The mechanism is as follows:

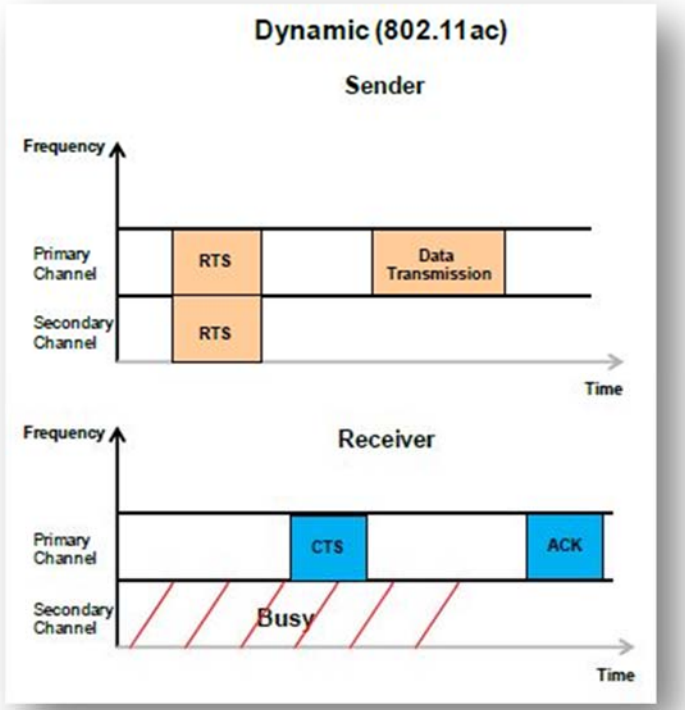
1. An 802.11ac device sends an RTS. Basic 802.11a transmission, which is 20 MHz wide, is replicated another three times to fill the 80 MHz or another seven times to fill 160 MHz. Each nearby device, regardless of whether the primary channel is the 20 MHz channel over the 80 MHz or 160 MHz channel, can receive the RTS. Each device that receives the RTS sets virtual sub-channels in busy state.
2. The device that receives the RTS checks whether the primary channel or sub-channels of the 80 MHz channel are busy. If some channel bandwidth is used, the receiver replies with a CTS with available bandwidth and reports repeated bandwidth.
3. A CTS is sent over each available 20 MHz sub-channel.

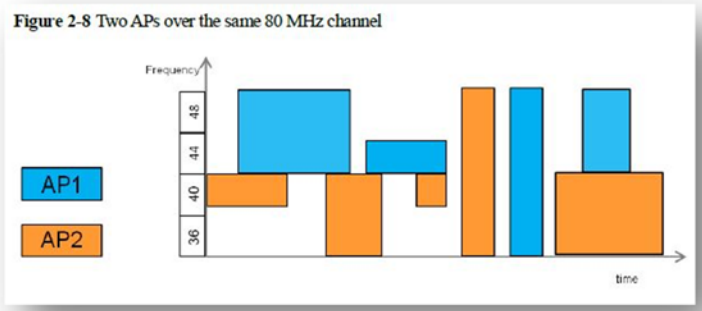
The sender can learn available and unavailable channels. Then data is sent only over available sub-channels.

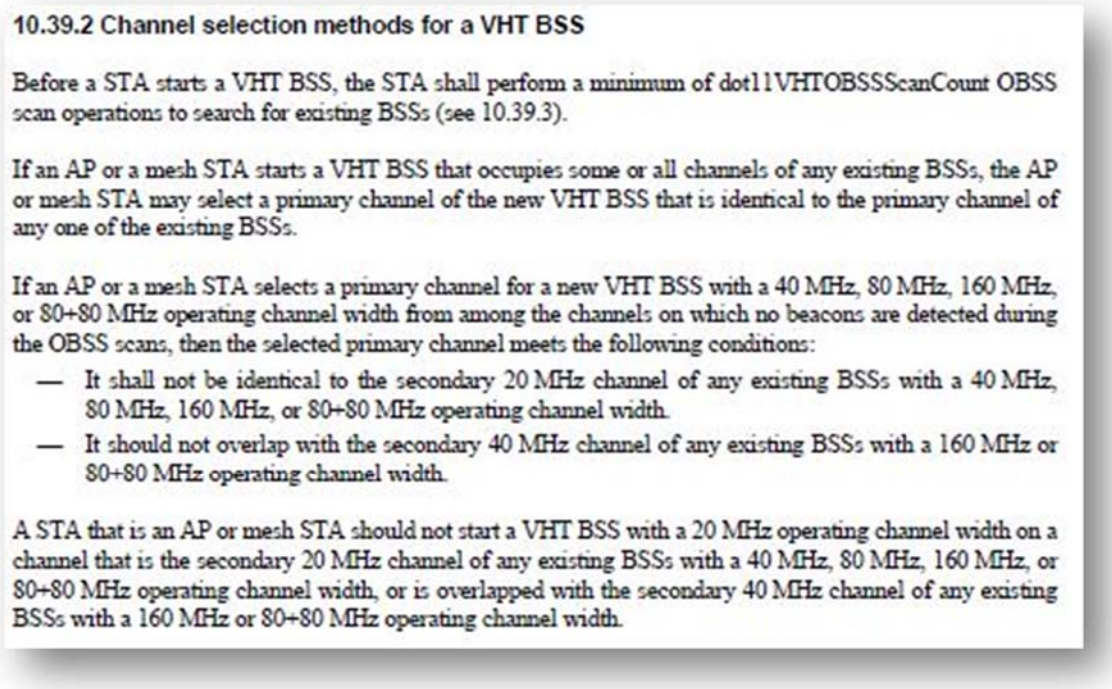
Huawei, WLAN 802.11ac Technology White Paper, Version 1.0, April 23, 2014, at 11.

"The RTS/CTS exchange also performs both a type of fast collision inference and a transmission path check. If the return CTS is not detected by the STA originating the RTS, the originating STA may repeat the process (after observing the other medium-use rules) more quickly than if the long data frame had been transmitted and a return ACK frame had not been detected. An RTS/CTS exchange by VHT STAs also performs fast collision inference on the secondary 20 MHz channel,

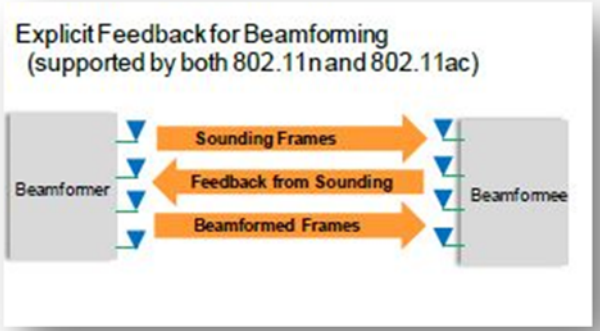
'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	secondary 40 MHz channel, and secondary 80 MHz channel and helps the VHT STA transmitting the RTS to determine the available bandwidth at the responder." IEEE Std 802.11ac-2013, at p. 120, *see also* IEEE Std 802.11-2012, at p. 824. "Another advantage of the RTS/CTS mechanism occurs where multiple BSSs utilizing the same channel overlap. The ***medium reservation mechanism*** works across the BSS boundaries" IEEE Std 802.11-2012, at p. 824.

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION
	 Huawei, WLAN 802.11ac Technology White Paper, Version 1.0, April 23, 2014, at 12, Figure 2-7.

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION
	 Huawei, WLAN 802.11ac Technology White Paper, Version 1.0, April 23, 2014, at 12, Figure 2-8.

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION
	 10.39.2 Channel selection methods for a VHT BSS Before a STA starts a VHT BSS, the STA shall perform a minimum of dot11VHTOBSSScanCount OBSS scan operations to search for existing BSSs (see 10.39.3). If an AP or a mesh STA starts a VHT BSS that occupies some or all channels of any existing BSSs, the AP or mesh STA may select a primary channel of the new VHT BSS that is identical to the primary channel of any one of the existing BSSs. If an AP or a mesh STA selects a primary channel for a new VHT BSS with a 40 MHz, 80 MHz, 160 MHz, or 80+80 MHz operating channel width from among the channels on which no beacons are detected during the OBSS scans, then the selected primary channel meets the following conditions: — It shall not be identical to the secondary 20 MHz channel of any existing BSSs with a 40 MHz, 80 MHz, 160 MHz, or 80+80 MHz operating channel width. — It should not overlap with the secondary 40 MHz channel of any existing BSSs with a 160 MHz or 80+80 MHz operating channel width. A STA that is an AP or mesh STA should not start a VHT BSS with a 20 MHz operating channel width on a channel that is the secondary 20 MHz channel of any existing BSSs with a 40 MHz, 80 MHz, 160 MHz, or 80+80 MHz operating channel width, or is overlapped with the secondary 40 MHz channel of any existing BSSs with a 160 MHz or 80+80 MHz operating channel width. IEEE Std 802.11ac-2013, at p. 187.

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	10.39.4 Channel switching methods for a VHT BSS A VHT AP announces a switch of operating channel by either of the following: — Using the Channel Switch Announcement element, Channel Switch Announcement frame, or both, following the procedure described in 10.9.8.2 — Using the Extended Channel Switch Announcement element, Extended Channel Switch Announcement frame, or both, following the procedure described in 10.10 A VHT mesh STA announces a switch attempt of operating channel by either of the following: — Using the Channel Switch Announcement element, Channel Switch Announcement frame, or both, following the procedure described in 10.9.8.4 — Using the Extended Channel Switch Announcement element, Extended Channel Switch Announcement frame, or both, following the procedure described in 10.10 A VHT AP or a VHT mesh STA may also announce a switch of operating channel width, a new Country String field (possibly including a new Operating Class table number), new operating classes, or new TPC parameters for the BSS that come into effect at the same time as the switch of operating channel. IEEE Std 802.11ac-2013, at p. 188.

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION
	 Huawei, WLAN 802.11ac Technology White Paper, Version 1.0, April 23, 2014, at 9, Figure 2-1. "Multiple APs build a mesh topology where signals are routed from one AP to another AP and finally transmitted through the AP connected to a fixed line to a wired network" Huawei, Mesh Technology White Paper, Issue 01, May 10, 2013, at 1. "A WMN saves cables required between mesh nodes while providing path redundancy and rerouting functions as a distributed network. When a new AP is added to a WMN, the AP can automatically connect to the WMN and ***determine the optimal multi-hop transmission path*** after being powered on. When a new AP is moved from a WMN, the WMN can automatically discover the topology change and ***adjust communication routes to obtain the optimal transmission path***" Huawei, Mesh Technology White Paper, Issue 01, May 10, 2013, at 2; *see also*, Huawei, Mesh Configuration Guide at 739.

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	"Mesh point (MP): a mesh-capable node that uses IEEE 802.11 MAC and physical layer protocols for wireless communication. This node supports ***automatic topology discovery, automatic route discovery***, and data packet forwarding." Huawei, Mesh Technology White Paper, Issue 01, May 10, 2013, at 3. "***Mesh path selection*** enables path discovery over multiple instances of the wireless medium within a mesh BSS. The overview of the mesh path selection framework is described in 13.8. The hybrid wireless mesh protocol (HWMP) is defined as the default path selection protocol for the mesh BSS. HWMP provides both proactive path selection and reactive path selection. The details of HWMP are described in 13.10. The ***path selection protocol uses link metrics in the assessment of a mesh path to the destination***." IEEE Std 802.11-2012, at p. 66. "Once the mesh path of a particular pair of the source mesh STA and the destination mesh STA is found through the mesh path selection function, mesh STAs propagate the data by the forwarding function. The details of the forwarding function are described in 9.32." IEEE Std 802.11-2012, at p. 66.

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**

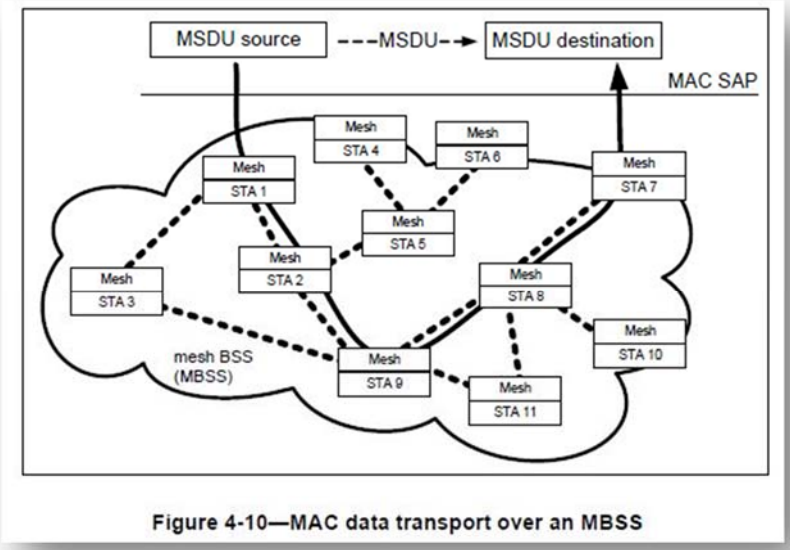
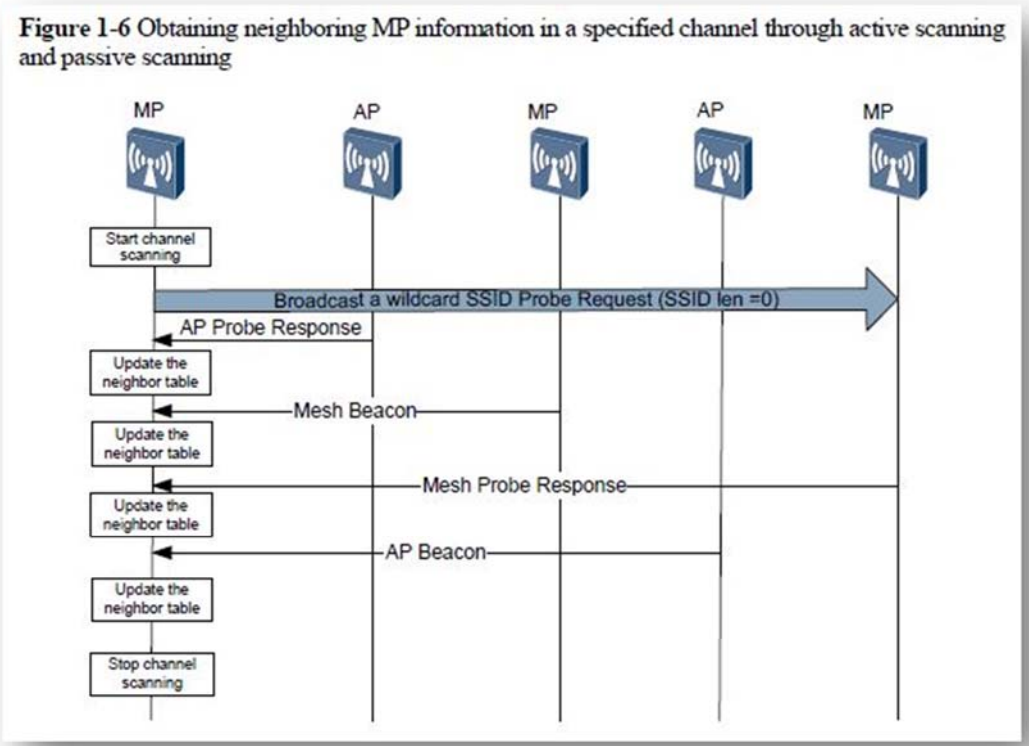


Figure 4-10—MAC data transport over an MBSS

IEEE Std 802.11-2012, at p. 66, Figure 4-10.

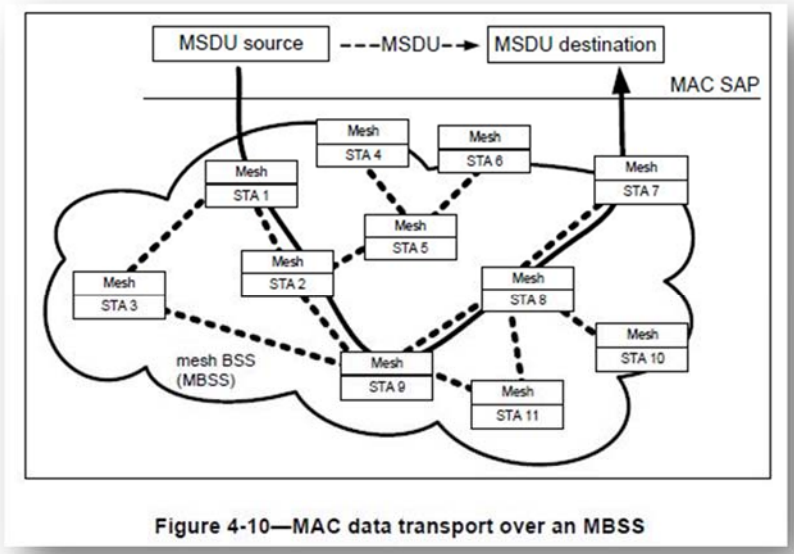
> "Intermediate mesh STAs create a path to the target mesh STA on receiving the PREP, and also forward the PREP toward the originator. When the originator receives the PREP, it creates a path to the target mesh STA. If the target mesh STA receives further PREQs with a better metric, then the target updates its path to the originator with the new path and also sends a new PREP to the originator along the updated path. A bidirectional, ***best metric end-to-end path is established*** between the originator and target mesh STA."

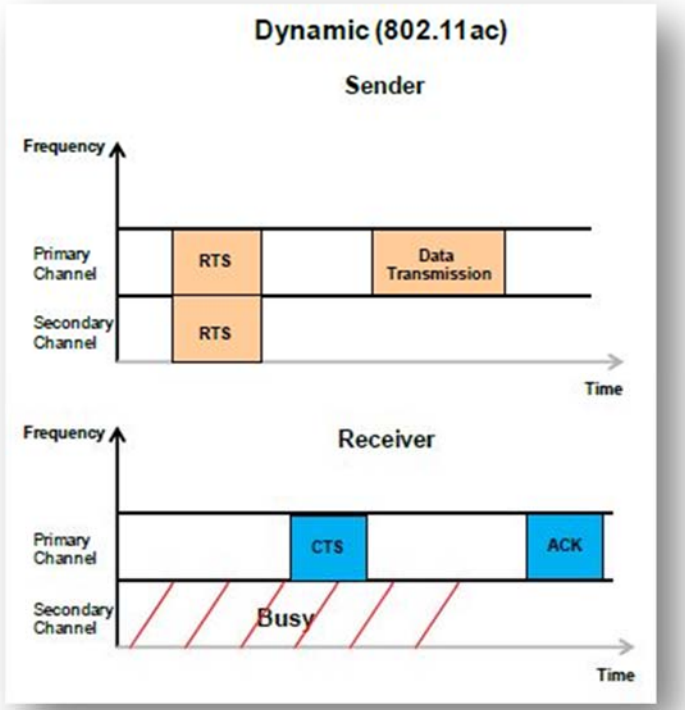
IEEE Std 802.11-2012, at p. 1386.

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION
	 Huawei, Mesh Technology White Paper, Issue 01, May 10, 2013, at 4, Figure 1-6.

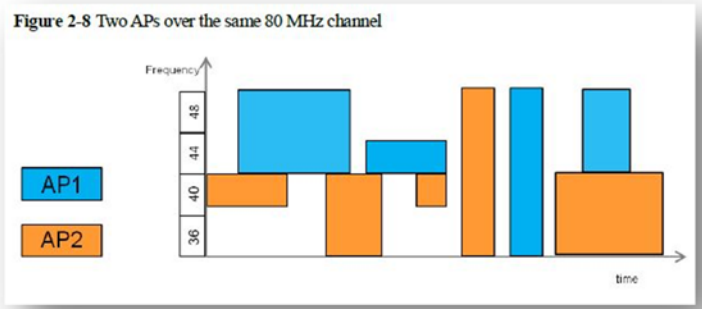
'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	"A WMN includes the following devices: • Mesh point (MP): a mesh-capable node that uses IEEE 802.11 MAC and physical layer protocols for wireless communication. This node supports automatic topology discovery, automatic route discovery, and data packet forwarding. MPs can provide both mesh service and user access service." Huawei, Configuration Guide – WLAN-AC, at 739. "If network access service needs to be provided for different areas, multiple ***MPPs need to work in different channels*** to prevent MPs from preempting wireless channels and improve coverage performance. Each MP can ***select the MPP with the minimum hops from the MP*** as the gateway to connect the wired network." Huawei, Configuration Guide – WLAN-AC, at 744. "***WLAN channel management and channel rate adjustment*** Automatic channel scanning and interference avoidance" Huawei, Agile Distributed Wi-Fi Solution, Datasheet, at 10. "Carrier bandwidth is doubled for Huawei 802.11ac APs, with extended channels and more subcarriers for data transmission." Huawei, Huawei Enterprise AP Series 802.11ac Brochure, at 1. "Huawei applies innovative technologies to WLAN products, including dynamic power adjustment, channel optimization, 5-G prior, and dynamic load balancing, which enables wireless networks to be deployed rapidly and automatically adjusts to network changes in real time, improving network

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	running efficiency and radio performance. Interference suppression technologies, such as Clear Channel Assessment (CCA), rogue device detection, and radio calibration dynamically detect and minimize interference in the radio environment, creating a clean radio experience." Huawei, Huawei Enterprise AP Series 802.11ac Brochure, at 6. "Automatic radio calibration allows an AP to collect signal strength and channel parameters of surrounding APs and generate AP topology according to the collected data. Based on interference from authorized APs, rogue APs, and non-Wi-Fi interference sources, each AP ***automatically adjusts its transmit power and working channel*** to make the network operate at the optimal performance. In this way, network reliability and user experience are improved." Huawei, AP4051DN & AP4151DN Access Points, Datasheet, at 3; *see also* Huawei, AP8050DN & AP8150DN Access Points, Datasheet, at 3; Huawei, AP2030DN Access Point, Datasheet, at 2; Huawei, AP4050DN-E Access Point, Datasheet, at 3
[e] at the source node, sending a transmission to the destination node along the selected route.	The Huawei '426 Patent Accused Products incorporate a mobile ad hoc network comprising source nodes, that send a transmission to the destination node along the selected route. The **Huawei Wi-Fi Products** incorporate a mobile ad hoc network comprising source nodes, that send a transmission to the destination node along the selected route. For example, and without limitation: *See* claim element 1[d] above.

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	 **Figure 4-10—MAC data transport over an MBSS** IEEE Std 802.11-2012, at p. 66, Figure 4-10.

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION
	 Huawei, WLAN 802.11ac Technology White Paper, Version 1.0, April 23, 2014, at 12, Figure 2-7.

'426 PATENT CLAIM 1	INFRINGEMENT BY HUAWEI CORPORATION



Huawei, WLAN 802.11ac Technology White Paper, Version 1.0, April 23, 2014, at 12, Figure 2-8.

> "The sender can learn available and unavailable channels. Then ***data is sent only over available sub-channels***."

Huawei, WLAN 802.11ac Technology White Paper, Version 1.0, April 23, 2014, at 11.

> "Multiple APs build a mesh topology where signals are routed from one AP to another AP and finally transmitted through the AP connected to a fixed line to a wired network"

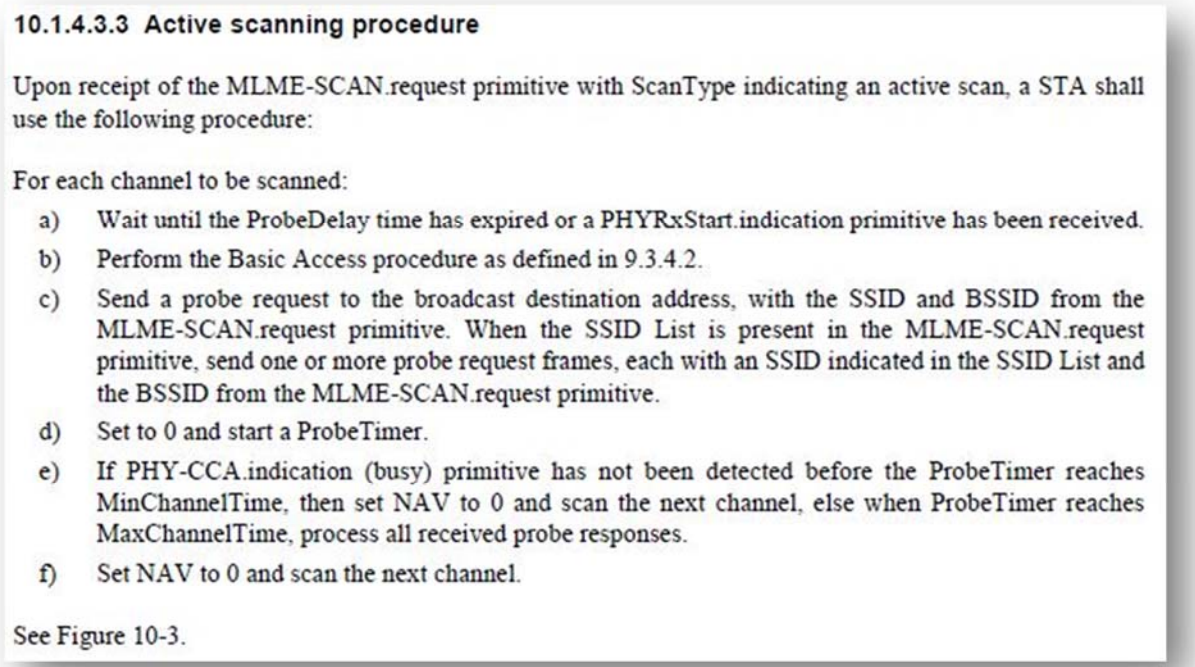
Huawei, Mesh Technology White Paper, Issue 01, May 10, 2013, at 1.

> "A WMN saves cables required between mesh nodes while providing path redundancy and rerouting functions as a distributed network. When a new AP is added to a WMN, the AP can automatically connect to the WMN and determine the optimal multi-hop transmission path after being powered on. When a new AP is moved from a WMN, the WMN can automatically discover the topology change and adjust communication routes to obtain the optimal transmission path."

'426 PATENT CLAIM 1	**INFRINGEMENT BY HUAWEI CORPORATION**
	Huawei, Mesh Technology White Paper, Issue 01, May 10, 2013, at 2. "Mesh point (MP): a mesh-capable node that uses IEEE 802.11 MAC and physical layer protocols for wireless communication. This node supports automatic topology discovery, automatic route discovery, and ***data packet forwarding***." Huawei, Mesh Technology White Paper, Issue 01, May 10, 2013, at 3. "Carrier bandwidth is doubled for Huawei 802.11ac APs, with extended channels and more subcarriers for data transmission." Huawei, Huawei Enterprise AP Series 802.11ac Brochure, at 1.

'426 PATENT CLAIM 2	**INFRINGEMENT BY HUAWEI CORPORATION**
2. A method according to claim 1 wherein the source node sends the route request over each of the plurality of channels sequentially.	The Huawei '426 Patent Accused Products infringe this claim. See claim element 1[a] above. The Huawei '426 Patent Accused Products incorporate a mobile ad hoc network comprising source nodes, that send the route request over each of the plurality of channels sequentially. The **Huawei Wi-Fi Products** incorporate a mobile ad hoc network comprising source nodes, that send the route request over each of the plurality of channels sequentially. For example, and without limitation: "An OBSS scan operation is a passive or active scan of a set of channels that are potentially affected by VHT BSS operation (see 10.1.4.1). Each channel in the set may be scanned more than

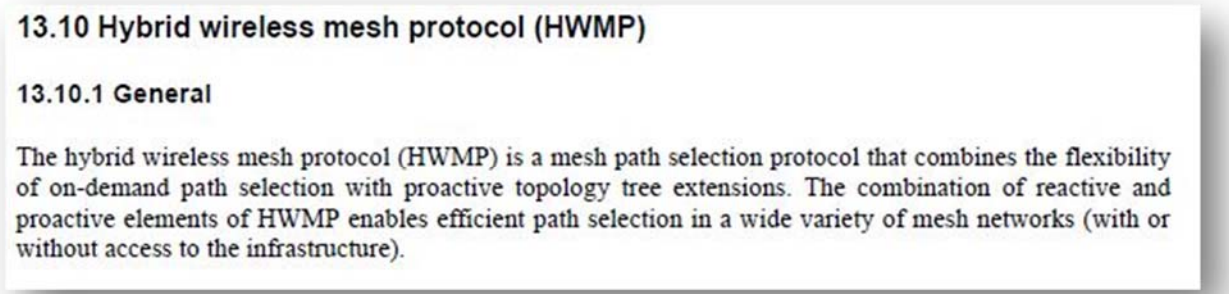
'426 PATENT CLAIM 2	**INFRINGEMENT BY HUAWEI CORPORATION**
	once during a single OBSS scan operation. OBSS scans are performed by STAs that start a VHT BSS." IEEE Std 802.11ac-2013, at p. 188. "A STA shall operate in either a Passive Scanning mode or an Active Scanning mode depending on the current value of the ScanMode parameter of the MLME-SCAN.request primitive. . . . Upon receipt of the MLME-SCAN.request primitive, a STA shall perform scanning." IEEE Std 802.11-2012, at p. 977. "If the ScanType parameter indicates a passive scan, the STA shall listen to each channel scanned for no longer than a maximum duration defined by the MaxChannelTime parameter." IEEE Std 802.11-2012, at p. 978.

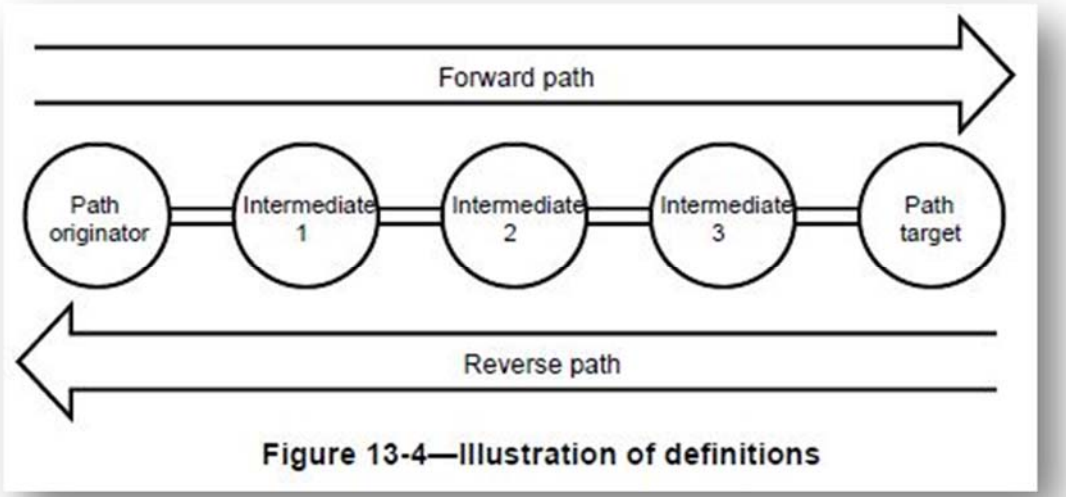
'426 PATENT CLAIM 2	INFRINGEMENT BY HUAWEI CORPORATION
	 **10.1.4.3.3 Active scanning procedure** Upon receipt of the MLME-SCAN.request primitive with ScanType indicating an active scan, a STA shall use the following procedure: For each channel to be scanned: a) Wait until the ProbeDelay time has expired or a PHYRxStart.indication primitive has been received. b) Perform the Basic Access procedure as defined in 9.3.4.2. c) Send a probe request to the broadcast destination address, with the SSID and BSSID from the MLME-SCAN.request primitive. When the SSID List is present in the MLME-SCAN.request primitive, send one or more probe request frames, each with an SSID indicated in the SSID List and the BSSID from the MLME-SCAN.request primitive. d) Set to 0 and start a ProbeTimer. e) If PHY-CCA.indication (busy) primitive has not been detected before the ProbeTimer reaches MinChannelTime, then set NAV to 0 and scan the next channel, else when ProbeTimer reaches MaxChannelTime, process all received probe responses. f) Set NAV to 0 and scan the next channel. See Figure 10-3. IEEE Std 802.11-2012, at p. 980 ("scan the next channel").

'426 PATENT CLAIM 3	**INFRINGEMENT BY HUAWEI CORPORATION**
3. A method according to claim 1 wherein the route request includes a source node channel identifier.	The Huawei '426 Patent Accused Products infringe this claim. *See* claim element 1[a] above. The Huawei '426 Patent Accused Products incorporate a mobile ad hoc network comprising source nodes, that send the route request such the route request includes a source node channel identifier. The **Huawei Wi-Fi Products** incorporate a mobile ad hoc network comprising source nodes, that send the route request such the route request includes a source node channel number. For example, and without limitation: **10.11 Radio measurement procedures** **10.11.9 Specific measurement usage** **10.11.9.1 Beacon Report** ***Change the ninth paragraph of 10.11.9.1 as follows:*** On accepting an active or passive mode Beacon measurement request, a STA shall conduct measurements as follows: — If the Channel Number is 0 and the Operating Class identifies the location of the primary channel, then a STA shall conduct iterative measurements on all supported channels in the specified Operating Class where measurement is permitted on the channel and the channel is valid for the current regulatory domain. IEEE Std 802.11ac-2013, at p. 179.

'426 PATENT CLAIM 3	**INFRINGEMENT BY HUAWEI CORPORATION**
	"If the Channel Number is a value other than 0 or 255, then a STA shall conduct iterative measurements on the requested channel that Channel Number, where the measurement is permitted on the channel and the channel is valid for the current regulatory domain." IEEE Std 802.11ac-2013, at p. 180.

'426 PATENT CLAIM 4	**INFRINGEMENT BY HUAWEI CORPORATION**
4. A method according to claim 1 wherein generating the reply to the source node for each discovered route comprises sending the reply back to the source node along the discovered route in reverse.	The Huawei '426 Patent Accused Products infringe this claim. See claim element 1[c] above. The Huawei '426 Patent Accused Products incorporate a mobile ad hoc network comprising destination nodes, that generate a reply to the source node for each discovered route by sending the reply back to the source node along the discovered route in reverse. The **Huawei Wi-Fi Products** incorporate a mobile ad hoc network comprising destination nodes, that generate a reply to the source node for each discovered route by sending the reply back to the source node along the discovered route in reverse. For example, and without limitation:

'426 PATENT CLAIM 4	**INFRINGEMENT BY HUAWEI CORPORATION**
	 13.10 Hybrid wireless mesh protocol (HWMP) 13.10.1 General The hybrid wireless mesh protocol (HWMP) is a mesh path selection protocol that combines the flexibility of on-demand path selection with proactive topology tree extensions. The combination of reactive and proactive elements of HWMP enables efficient path selection in a wide variety of mesh networks (with or without access to the infrastructure). IEEE Std 802.11-2012, at p. 1382.

'426 PATENT CLAIM 4	INFRINGEMENT BY HUAWEI CORPORATION
	 **Figure 13-4—Illustration of definitions** IEEE Std 802.11-2012, at p. 1383. "reverse path: The reverse path is the mesh path to the path originator, set up at the path target and intermediate mesh STAs." IEEE Std 802.11-2012, at p. 1384. "Whenever a mesh STA propagates a PREQ, the metric field in the PREQ is updated to reflect the cumulative metric of the path to the originator mesh STA. After creating or updating a path to the originator mesh STA, the target mesh STA sends an individually addressed PREP back to the originator mesh STA.

'426 PATENT CLAIM 4	**INFRINGEMENT BY HUAWEI CORPORATION**
	If the mesh STA that received a PREQ is the target mesh STA, it sends an individually addressed PREP back to the originator mesh STA after creating or updating a path to the originator mesh STA." IEEE Std 802.11-2012, at p. 1385.

'426 PATENT CLAIM 5	**INFRINGEMENT BY HUAWEI CORPORATION**
5. A method according to claim 1 further comprising, at the source node, prioritizing discovered routes.	The Huawei '426 Patent Accused Products infringe this claim. *See* claim element 1[d] above. The Huawei '426 Patent Accused Products incorporate a mobile ad hoc network comprising source nodes, that prioritizing discovered routes. The **Huawei Wi-Fi Products** incorporate a mobile ad hoc network comprising source nodes, that prioritizing discovered routes. For example, and without limitation: "Intermediate mesh STAs create a path to the target mesh STA on receiving the PREP, and also forward the PREP toward the originator. When the originator receives the PREP, it creates a path to the target mesh STA. If the target mesh STA receives further PREQs with a better metric, then the target updates its path to the originator with the new path and also sends a new PREP to the originator along the updated path. A bidirectional, ***best metric end-to-end path is established*** between the originator and target mesh STA." IEEE Std 802.11-2012, at p. 1386. "A WMN saves cables required between mesh nodes while providing path redundancy and rerouting functions as a distributed network. When a new AP is added to a WMN, the AP can

'426 PATENT CLAIM 5	**INFRINGEMENT BY HUAWEI CORPORATION**
	automatically connect to the WMN and determine the optimal multi-hop transmission path after being powered on. When a new AP is moved from a WMN, the WMN can automatically discover the topology change and ***adjust communication routes to obtain the optimal transmission path***" Huawei, Mesh Technology White Paper, Issue 01, May 10, 2013, at 2. "If network access service needs to be provided for different areas, multiple MPPs need to work in different channels to prevent MPs from preempting wireless channels and improve coverage performance. Each MP can ***select the MPP with the minimum hops from the MP*** as the gateway to connect the wired network." Huawei, Configuration Guide – WLAN-AC, at 744.

'426 PATENT CLAIM 6	**INFRINGEMENT BY HUAWEI CORPORATION**
6. A method according to claim 5 wherein prioritizing comprises calculating a metric for each discovered route to the destination node, the metric being based upon at least one of available bandwidth, error rate, end-to-end delay, end-to-end delay variation, hop count, expected path durability, and priority.	The Huawei '426 Patent Accused Products infringe this claim. *See* claim element 5 above. The Huawei '426 Patent Accused Products incorporate a mobile ad hoc network comprising source nodes, that calculate a metric for each discovered route to the destination node, the metric being based upon at least one of available bandwidth, error rate, end-to-end delay, end-to-end delay variation, hop count, expected path durability, and priority. The **Huawei Wi-Fi Products** incorporate a mobile ad hoc network comprising source nodes, that calculate a metric for each discovered route to the destination node, the metric being based upon at least one of available bandwidth, error rate, end-to-end delay, end-to-end delay variation, hop count, expected path durability, and priority. For example, and without limitation:

'426 PATENT CLAIM 6	INFRINGEMENT BY HUAWEI CORPORATION
	"Mesh path selection enables path discovery over multiple instances of the wireless medium within a mesh BSS. The overview of the mesh path selection framework is described in 13.8. The hybrid wireless mesh protocol (HWMP) is defined as the default path selection protocol for the mesh BSS. HWMP provides both proactive path selection and reactive path selection. The details of HWMP are described in 13.10. The ***path selection protocol uses link metrics in the assessment of a mesh path to the destination***." IEEE Std 802.11-2012, at p. 66. "This subclause defines a default link metric that may be used by a path selection protocol to identify an efficient radio-aware path. The extensibility framework allows this metric to be overridden by any path selection metric as specified in the mesh profile. Airtime reflects the amount of channel resources consumed by transmitting the frame over a particular link. This measure is approximate and designed for ease of implementation and interoperability." IEEE Std 802.11-2012, at p. 1381. "Whenever a mesh STA propagates a PREQ, the ***metric field*** in the PREQ is updated to reflect the ***cumulative metric of the path*** to the originator mesh STA. After creating or updating a path to the originator mesh STA, the target mesh STA sends an individually addressed PREP back to the originator mesh STA." IEEE Std 802.11-2012, at p. 1385. "Intermediate mesh STAs create a path to the target mesh STA on receiving the PREP, and also forward the PREP toward the originator. When the originator receives the PREP, it creates a path to the target mesh STA. If the target mesh STA receives further PREQs with a ***better metric***, then the target updates its path to the originator with the new path and also sends a new PREP to the

'426 PATENT CLAIM 6	**INFRINGEMENT BY HUAWEI CORPORATION**
	originator along the updated path. A bidirectional, ***best metric end-to-end path is established*** between the originator and target mesh STA." IEEE Std 802.11-2012, at p. 1386.

'426 PATENT CLAIM 7	**INFRINGEMENT BY HUAWEI CORPORATION**
7. A method according to claim 1 wherein a selected route to the destination node includes more than one of the plurality of channels.	The Huawei '426 Patent Accused Products infringe this claim. *See* claim element 1[d] above. The Huawei '426 Patent Accused Products incorporate a mobile ad hoc network comprising source nodes, that select a route to the destination node that includes more than one of the plurality of channels. The **Huawei Wi-Fi Products** incorporate a mobile ad hoc network comprising source nodes, that select a route to the destination node that includes more than one of the plurality of channels. For example, and without limitation:

'426 PATENT CLAIM 7	INFRINGEMENT BY HUAWEI CORPORATION

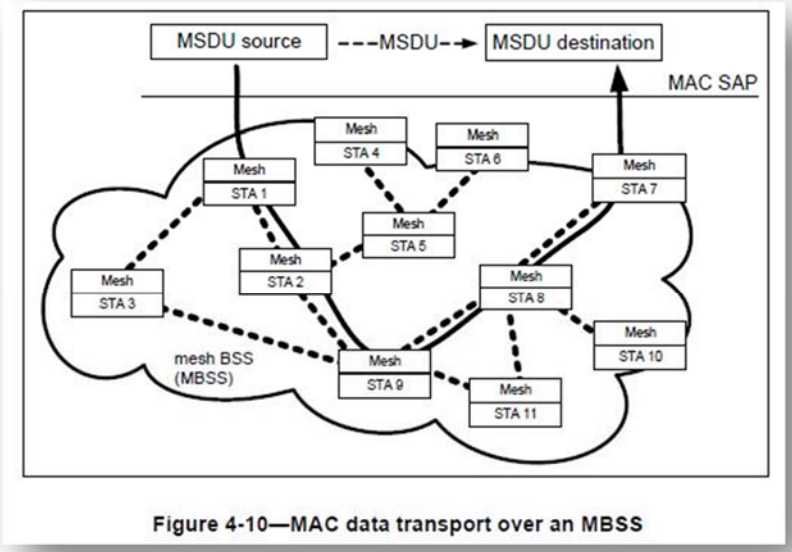


Figure 4-10—MAC data transport over an MBSS

IEEE Std 802.11-2012, at p. 66, Figure 4-10.

> "Intermediate mesh STAs create a path to the target mesh STA on receiving the PREP, and also forward the PREP toward the originator. When the originator receives the PREP, it creates a path to the target mesh STA. If the target mesh STA receives further PREQs with a better metric, then the target updates its path to the originator with the new path and also sends a new PREP to the originator along the updated path. A bidirectional, ***best metric end-to-end path is established*** between the originator and target mesh STA."

IEEE Std 802.11-2012, at p. 1386

'426 PATENT CLAIM 7	INFRINGEMENT BY HUAWEI CORPORATION
	"If network access service needs to be provided for different areas, multiple ***MPPs need to work in different channels*** to prevent MPs from preempting wireless channels and improve coverage performance. Each MP can ***select the MPP with the minimum hops from the MP*** as the gateway to connect the wired network." Huawei, Configuration Guide – WLAN-AC, at 744. "WLAN channel management and channel rate adjustment Automatic channel scanning and interference avoidance" Huawei, Agile Distributed Wi-Fi Solution, Datasheet, at 10. "Carrier bandwidth is doubled for Huawei 802.11ac APs, with extended channels and more subcarriers for data transmission." Huawei, Huawei Enterprise AP Series 802.11ac Brochure, at 1. "Huawei applies innovative technologies to WLAN products, including dynamic power adjustment, channel optimization, 5-G prior, and dynamic load balancing, which enables wireless networks to be deployed rapidly and automatically adjusts to network changes in real time, improving network running efficiency and radio performance. Interference suppression technologies, such as Clear Channel Assessment (CCA), rogue device detection, and radio calibration dynamically detect and minimize interference in the radio environment, creating a clean radio experience." Huawei, Huawei Enterprise AP Series 802.11ac Brochure, at 6. "Automatic radio calibration allows an AP to collect signal strength and channel parameters of surrounding APs and generate AP topology according to the collected data. Based on interference from authorized APs, rogue APs, and non-Wi-Fi interference sources, each AP ***automatically***

'426 PATENT CLAIM 7	**INFRINGEMENT BY HUAWEI CORPORATION**
	adjusts its transmit power and ***working channel*** to make the network operate at the optimal performance. In this way, network reliability and user experience are improved." Huawei, AP4051DN & AP4151DN Access Points, Datasheet, at 3; *see also* Huawei, AP8050DN & AP8150DN Access Points, Datasheet, at 3; Huawei, AP2030DN Access Point, Datasheet, at 2; Huawei, AP4050DN-E Access Point, Datasheet, at 3 The **Huawei Zigbee Products** incorporate a mobile ad hoc network comprising source nodes, that select a route to the destination node that includes more than one of the plurality of channels. For example, and without limitation:

'426 PATENT CLAIM 8	**INFRINGEMENT BY HUAWEI CORPORATION**
A method for operating a mobile ad hoc network comprising a plurality of wireless mobile nodes and a plurality of wireless communication links connecting the plurality of nodes together over a plurality of electrically separate wireless channels, the method comprising:	The Huawei '426 Patent Accused Products infringe this claim. The Huawei '426 Patent Accused Products incorporate a mobile ad hoc network comprising wireless mobile nodes and wireless communication links connecting the nodes together over electrically separate wireless channels. The Huawei '426 Patent Accused Products include the Huawei Wi-Fi Products and the Huawei Zigbee Products. The **Huawei Wi-Fi Products** incorporate a mobile ad hoc network comprising wireless mobile nodes and wireless communication links connecting the nodes together over electrically separate wireless channels. For example, and without limitation: *See* Claim 1 above.

'426 PATENT CLAIM 8	**INFRINGEMENT BY HUAWEI CORPORATION**
	The **Huawei Zigbee Products** incorporate a mobile ad hoc network comprising wireless mobile nodes and wireless communication links connecting the nodes together over electrically separate wireless channels. For example, and without limitation: Huawei is a "Promoter" level member of the Zigbee Alliance and produces products certified by Zigbee. *See, e.g.*, Zigbee Alliance, Our Members, *available at* https://www.zigbee.org/zigbeealliance/our-members/ (last accessed March 27, 2019); Zigbee Alliance, Zigbee Certified Products, *available at* https://www.zigbee.org/zigbee-products-2/#zigbeecertifiedproducts/?view_30_search=Huawei&view_30_page=1 (last accessed March 27, 2019) The Huawei Zigbee Products comply with the Zigbee standards, including the IEEE 802.15.4 standard (defining the Medium Access Control (MAC) and Physical (PHY) sublayers for Low-Rate Wireless Personal Area Networks (LR-WPANs) connectivity), which is the basis for the MAC and PHY layers in Zigbee certified products. *See, e.g.*, Zigbee Alliance, Zigbee 3.0, *available at* https://www.zigbee.org/zigbee-for-developers/zigbee-3-0/ (last accessed March 27, 2019); *see also* ZigBee Alliance, ZigBee Specification, Version r06 (June 27, 2005), at 17-18; ZigBee Alliance, ZigBee Specification, Version r21 (Aug. 5, 2015), at 1 ("The IEEE 802.15.4 standard defines the two lower layers: the physical (PHY) layer and the medium access control (MAC) sub-layer. The ZigBee Alliance builds on this foundation by providing the network (NWK) layer and the framework for the application layer.").

'426 PATENT CLAIM 8	INFRINGEMENT BY HUAWEI CORPORATION

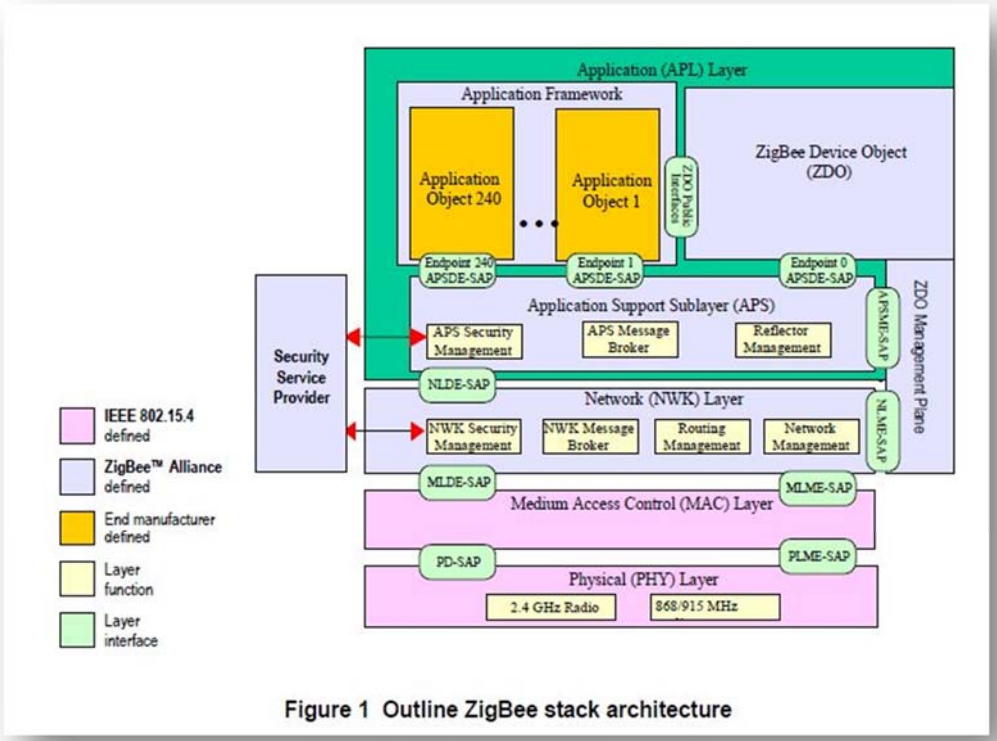


Figure 1 Outline ZigBee stack architecture

ZigBee Alliance, ZigBee Specification, Version r06 (June 27, 2005), at p. 18, Figure 1.

Huawei represents that certain of its products comply with and communicate according to the Zigbee standards. For example:

'426 PATENT CLAIM 8	**INFRINGEMENT BY HUAWEI CORPORATION**

This topic introduces the wireless network access indicators of the ONT.

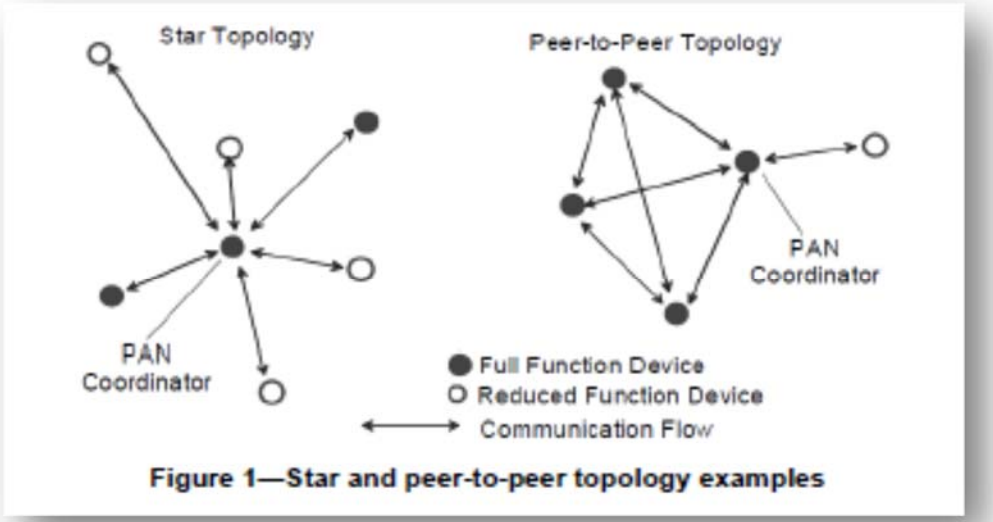
Table 9-1 Zigbee/Z-Wave access indicators

Indicator	Value(ZigBee)	Value(Z-Wave)
Standards compliance	IEEE 802.15.4 For ZHA1.2 and ZLL1.0 device management	ITU-T G.9959 For device plus management
Communication frequency	2.4GHz	• Australian standard: 908.4-916 MHz • U.S. standard: 919.8-921.42 MHz

Echolife ONT, Port Specifications, Jan. 24, 2019, at 10.

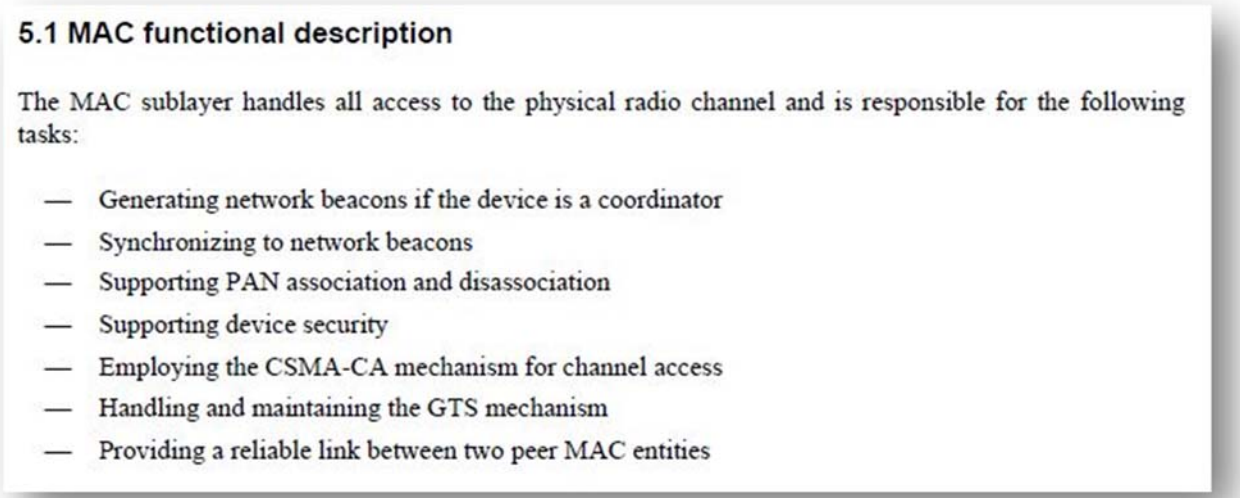
> "The AR502 series IoT gateway is designed for industrial environments and supports communication in harsh environments such as extreme temperature, high humidity, and electromagnetic interference. The built-in industrial-grade LTE module supports high bandwidth, low-latency wireless access, and various local interfaces (RS485/RS422, RS232, Gigabit Ethernet and ZigBee) for connecting serial interface devices, Ethernet devices. The AR502 applies to multiple IoT fields, such as smart grid and smart transportation."

Huawei AR502 Series IoT Gateway, Datasheet, at 2; *see also* Huawei AP7060DN Access Point Datasheet, *available at* https://e.huawei.com/us/related-page/products/enterprise-network/wlan/indoor-access-points/ap7060dn/wlan-ap7060dn (last accessed March 28, 2019), at 3; Huawei AR160-M Series Enterprise

'426 PATENT CLAIM 8	INFRINGEMENT BY HUAWEI CORPORATION
	Routers Data Sheet, *available at* https://e.huawei.com/it/related-page/products/enterprise-network/routers/ar-agile/ar160-m/router_ar160-m, at 2. Zigbee and IEEE 802.15.4 standards describe and require a mobile ad hoc network comprising wireless mobile nodes and wireless communication links. For example, and without limitation:  **Figure 1—Star and peer-to-peer topology examples** IEEE Standard for Local and Metropolitan Area Networks – Part 15.4: Low-Rate Wireless Personal Area Networks (LR-WPANs), IEEE Computer Society, IEEE Std 802.15.4-2011, at p. 9, Figure 1.

'426 PATENT CLAIM 8	INFRINGEMENT BY HUAWEI CORPORATION
	"A system conforming to this standard consists of several components. The most basic is the device. Two or more devices communicating on the same physical channel constitute a WPAN." IEEE Std 802.15.4-2011, at p. 8. "There are two device types: a full-function device (FFD) and a reduced-function device (RFD). The FFD may operate in three modes serving as a personal area network (PAN) coordinator, a coordinator, or a device. An RFD shall only operate as a device." IEEE Std 802.15.4-2011, at p. 18. "In a peer-to-peer topology, ***each device is capable of communicating with any other device within its radio communications range***. One device is nominated as the PAN coordinator, for instance, by virtue of being the first device to communicate on the channel." IEEE Std 802.15.4-2011, at p. 9. "An LR-WPAN device comprises at least one PHY, which contains the radio frequency (RF) transceiver along with its low-level control mechanism, and a MAC sublayer that provides access to the physical channel for all types of transfer. Figure 3 shows these blocks in a graphical representation, which are described in more detail in 4.4.1 and 4.4.2." IEEE Std 802.15.4-2011, at p. 11. "The PHY data service enables the transmission and reception of PHY protocol data units (PPDUs) across the physical radio channel. The general PHY requirements are described in Clause 8." IEEE Std 802.15.4-2011, at p. 11.

'426 PATENT CLAIM 8	**INFRINGEMENT BY HUAWEI CORPORATION**
	"Keywords: ***ad hoc network***, IEEE 802.15.4, low data rate, low power, LR-WPAN, mobility, PAN, personal area network, radio frequency, RF, short range, wireless, wireless personal area network, WPAN." IEEE Std 802.15.4-2011, at p. ii. "To illustrate, wireless networks rely on the ability for autonomous devices to join a network and discover other devices and services on devices within the network. Device and service discovery are features supported within the device profile" ZigBee Alliance, ZigBee Specification, Version r21 (Aug. 5, 2015), at 63. "*ad hoc* network devices" ZigBee Alliance, ZigBee Specification, Version r21 (Aug. 5, 2015), at 376. The Huawei Zigbee Products further communicate using electrically separate wireless channels. For example, and without limitation: Zigbee and IEEE 802.15.4 standards describe and require wireless communication links that utilize multiple electrically separate wireless channels. For example, and without limitation: "The features of the PHY are activation and deactivation of the radio transceiver, ED, LQI, ***channel selection***, clear channel assessment (CCA), and transmitting as well as receiving packets across the physical medium." IEEE Std 802.15.4-2011, at p. 11.

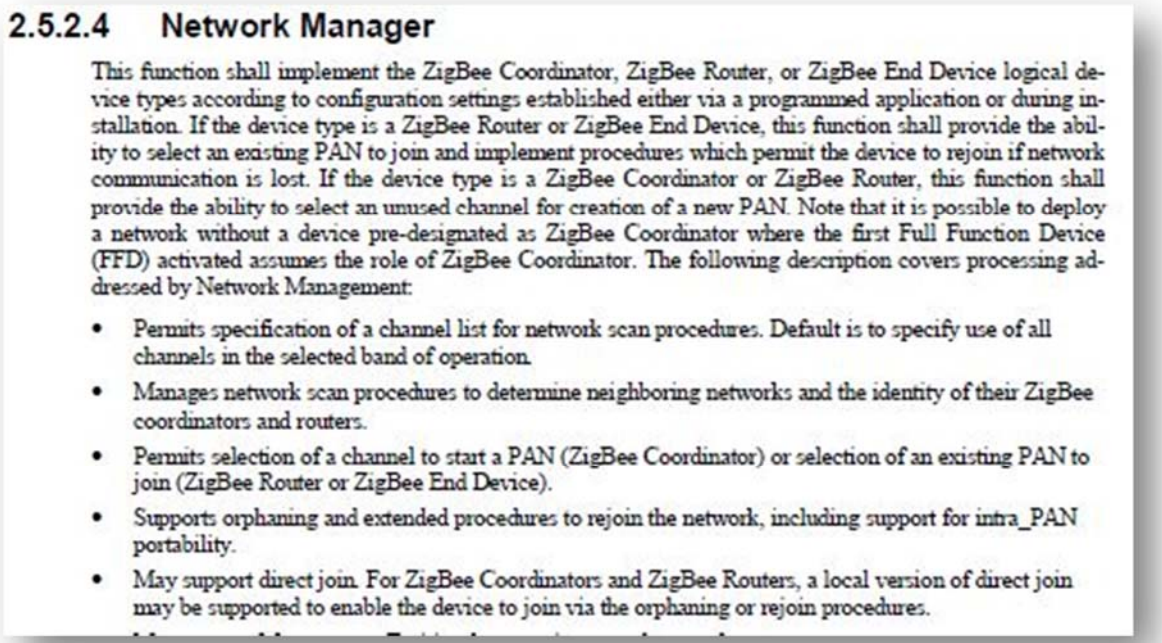
'426 PATENT CLAIM 8	**INFRINGEMENT BY HUAWEI CORPORATION**
	 **5.1 MAC functional description** The MAC sublayer handles all access to the physical radio channel and is responsible for the following tasks: — Generating network beacons if the device is a coordinator — Synchronizing to network beacons — Supporting PAN association and disassociation — Supporting device security — Employing the CSMA-CA mechanism for channel access — Handling and maintaining the GTS mechanism — Providing a reliable link between two peer MAC entities IEEE Std 802.15.4-2011, at p. 18. "The receiver ED measurement is intended for use by a network layer as part of a channel selection algorithm. It is an estimate of the received signal power within the bandwidth of the channel." IEEE Std 802.15.4-2011, at p. 153. "A compliant device shall support at least one of the following options: O-QPSK PHY at 2.4 GHz frequency band or the BPSK PHY at both 868 MHz and 915 MHz bands. Each of the frequency bands incorporates its own set of channels through a combination of channel numbers and channel pages."

'426 PATENT CLAIM 8	**INFRINGEMENT BY HUAWEI CORPORATION**
	ZigBee Alliance, ZigBee Specification, Version r21 (Aug. 5, 2015), at 495. "When there is a set of devices intended to be a part of the same ZigBee network, with devices of that set, potentially, supporting different frequency bands, the coordinator, during network establishment, may choose a channel from a frequency band that is not supported by some of the other devices" ZigBee Alliance, ZigBee Specification, Version r21 (Aug. 5, 2015), at 495. "At the same time moving a network from one frequency band to another within 868/915 MHz PHY is allowed since support of both bands is mandatory in accordance with IEEE P802.15.4" ZigBee Alliance, ZigBee Specification, Version r21 (Aug. 5, 2015), at 496. "The Mgmt_NWK_Update_notify is provided to enable ZigBee devices to report the condition on local channels to a network manager. The scanned channel list is the report of channels scanned and it is followed by a list of records, one for each channel scanned, each record including one byte of the energy level measured during the scan, or 0xff if there is too much interference on this channel." ZigBee Alliance, ZigBee Specification, Version r21 (Aug. 5, 2015), at 183. "The following description covers processing addressed by Network Management: —Permits specification of a channel list for network scan procedures. Default is to specify use of all channels in the selected band of operation. —Manages network scan procedures to determine neighboring networks and the identity of their ZigBee coordinators and routers.

'426 PATENT CLAIM 8	**INFRINGEMENT BY HUAWEI CORPORATION**
	—Permits selection of a channel to start a PAN (ZigBee Coordinator) or selection of an existing PAN to join (ZigBee Router or ZigBee End Device). —Supports orphaning procedures to rejoin the network." ZigBee Alliance, ZigBee Specification, Version r06 (June 27, 2005), at 135-36.
[a] at a source node, sending a route request over each of the plurality of electrically separate channels to discover routing to a destination node; and	The Huawei '426 Patent Accused Products incorporate a mobile ad hoc network comprising source nodes that send a route request over each of the plurality of electrically separate channels to discover routing to a destination node. The **Huawei Wi-Fi Products** incorporate a mobile ad hoc network comprising source nodes that send a route request over each of the plurality of electrically separate channels to discover routing to a destination node. For example, and without limitation: *See* claim element 1[b] above. The **Huawei Zigbee Products** incorporate a mobile ad hoc network comprising source nodes that send a route request over each of the plurality of electrically separate channels to discover routing to a destination node. For example, and without limitation: "If a coordinator receives the orphan notification command, the MLME shall send the MLME.ORPHAN.indication primitive, as described in 6.2.7.1, to the next higher layer. The next higher layer should then search its device list for the device indicated by the primitive. If the next higher layer finds a record of the device, it should send a coordinator realignment command to the orphaned device using the MLME.ORPHAN.response primitive, as described in 6.2.7.2 . . ." IEEE Std 802.15.4-2011, at p. 27.

'426 PATENT CLAIM 8	**INFRINGEMENT BY HUAWEI CORPORATION**
	"ZigBee router: an IEEE 802.15.4 FFD participating in a ZigBee network, which is not the ZigBee coordinator but may act as an IEEE 802.15.4 coordinator within its personal operating space, that is capable of ***routing messages between devices*** and supporting associations." ZigBee Alliance, ZigBee Specification, Version r21 (Aug. 5, 2015), at 11. "The responsibilities of the ZigBee NWK layer shall include mechanisms used to join and leave a network, to apply security to frames and to route frames to their intended destinations. In addition, the discovery and maintenance of routes between devices devolve to the NWK layer. Also the discovery of one-hop neighbors and the storing of pertinent neighbor information are done at the NWK layer. The NWK layer of a ZigBee coordinator (see 'Network topology') is responsible for starting a new network, when appropriate, and assigning addresses to newly associated devices" ZigBee Alliance, ZigBee Specification, Version r06 (June 27, 2005), at 17-18. "If the device type is a ZigBee Router or ZigBee End Device, this function shall provide the ability to select an existing PAN to join and implement orphaning procedures which permit the device to re-associate with the same ZigBee Coordinator or ZigBee Router if network communication is lost. If the device type is a ZigBee Coordinator or ZigBee Router, this function shall provide the ability to select an unused channel for creation of a new PAN. Note that is possible to deploy a network without a device pre-designated as ZigBee Coordinator where the first Full Function Device (FFD) activated device assumes the role of ZigBee Coordinator." ZigBee Alliance, ZigBee Specification, Version r06 (June 27, 2005), at 135.

'426 PATENT CLAIM 8	INFRINGEMENT BY HUAWEI CORPORATION



2.5.2.4 Network Manager

This function shall implement the ZigBee Coordinator, ZigBee Router, or ZigBee End Device logical device types according to configuration settings established either via a programmed application or during installation. If the device type is a ZigBee Router or ZigBee End Device, this function shall provide the ability to select an existing PAN to join and implement procedures which permit the device to rejoin if network communication is lost. If the device type is a ZigBee Coordinator or ZigBee Router, this function shall provide the ability to select an unused channel for creation of a new PAN. Note that it is possible to deploy a network without a device pre-designated as ZigBee Coordinator where the first Full Function Device (FFD) activated assumes the role of ZigBee Coordinator. The following description covers processing addressed by Network Management:

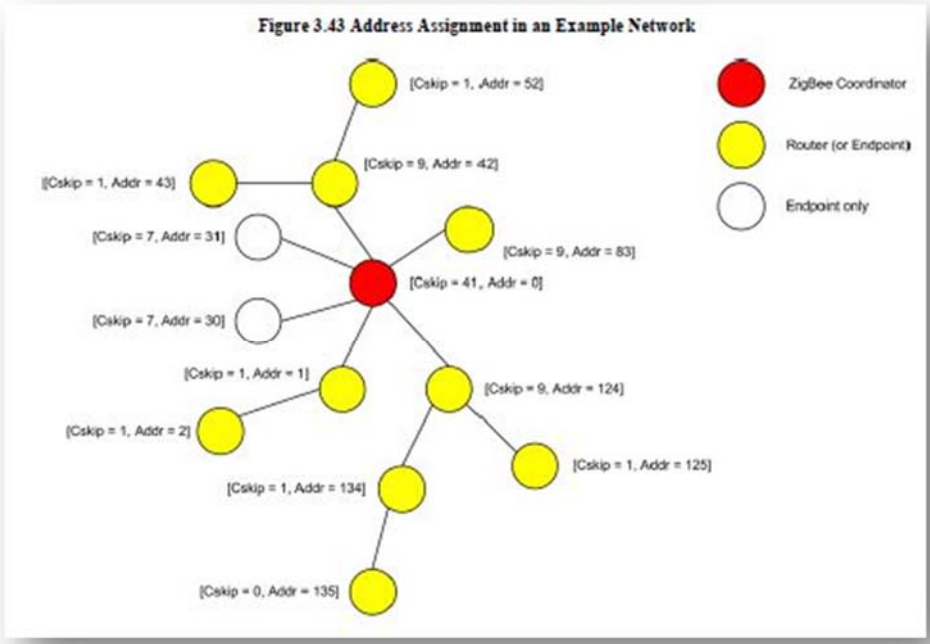
- Permits specification of a channel list for network scan procedures. Default is to specify use of all channels in the selected band of operation.
- Manages network scan procedures to determine neighboring networks and the identity of their ZigBee coordinators and routers.
- Permits selection of a channel to start a PAN (ZigBee Coordinator) or selection of an existing PAN to join (ZigBee Router or ZigBee End Device).
- Supports orphaning and extended procedures to rejoin the network, including support for intra_PAN portability.
- May support direct join. For ZigBee Coordinators and ZigBee Routers, a local version of direct join may be supported to enable the device to join via the orphaning or rejoin procedures.

ZigBee Alliance, ZigBee Specification, Version r21 (Aug. 5, 2015), at 189.

> "The ZigBee coordinator shall maintain a list of currently associated devices and facilitate support of orphan scan processing to enable previously associated devices to rejoin the network."

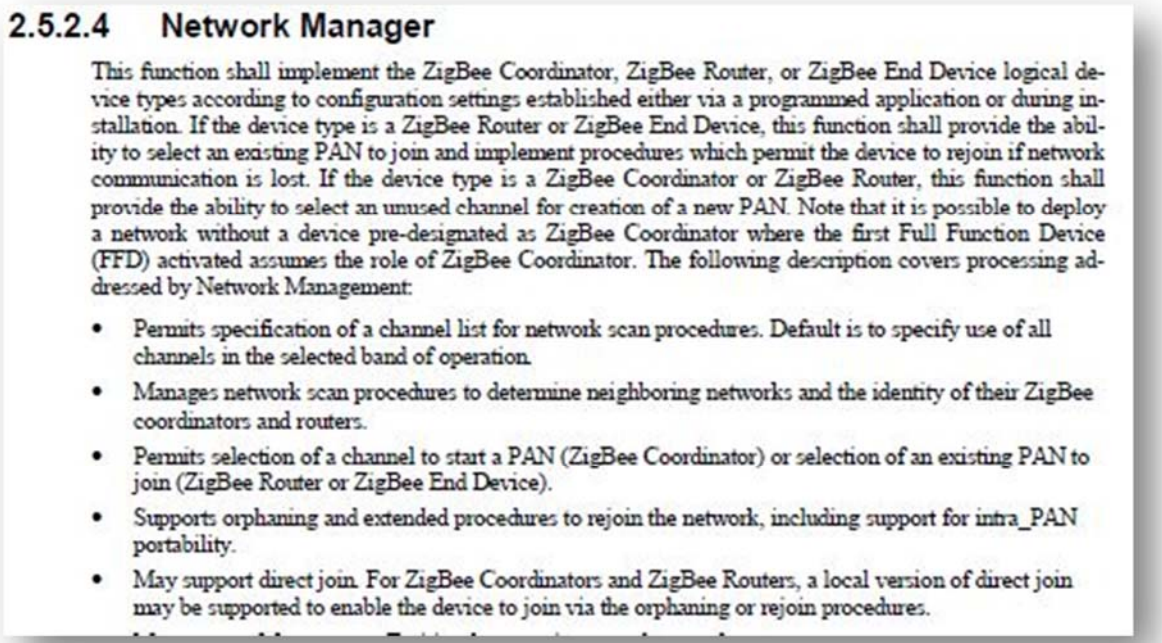
ZigBee Alliance, ZigBee Specification, Version r06 (June 27, 2005), at 142.

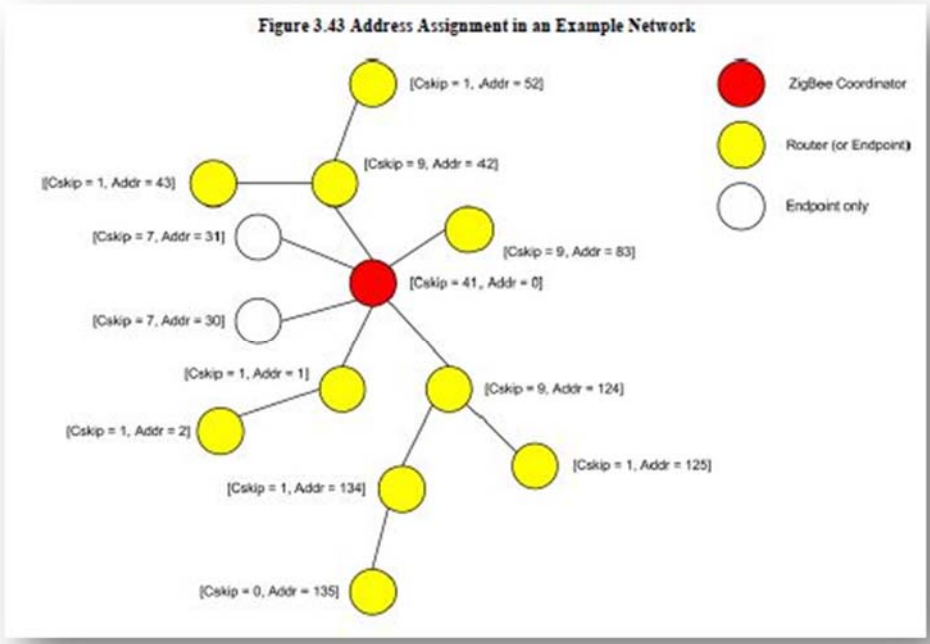
'426 PATENT CLAIM 8	**INFRINGEMENT BY HUAWEI CORPORATION**
	"The Parent_annce is provided to enable ZigBee routers (including the coordinator) on the network to notify other ZigBee routers about all the end devices known to the local device. This command provides a means to resolve conflicts more quickly than aging out the child, when multiple routers purport to be the active parent of a particular end-device. The command may be broadcast from one router to all routers and the coordinator using the broadcast address 0xFFFC or unicast from one router to another router. This message must be generated if all the following conditions are met: 1. ***The router or coordinator device has rebooted***. 2. The router or coordinator is operating in the joined and authenticated state." ZigBee Alliance, ZigBee Specification, Version r21 (Aug. 5, 2015), at 94.

'426 PATENT CLAIM 8	INFRINGEMENT BY HUAWEI CORPORATION
	 ZigBee Alliance, ZigBee Specification, Version r21 (Aug. 5, 2015), at 325, Figure 3.43; *see also* ZigBee Alliance, ZigBee Specification, Version r06 (June 27, 2005), at 224, Figure 54.

'426 PATENT CLAIM 8	**INFRINGEMENT BY HUAWEI CORPORATION**
[b] at the source node, selecting a route to the destination node on at least one of the plurality of electrically separate channels.	The Huawei '426 Patent Accused Products incorporate a mobile ad hoc network comprising source nodes that select a route to the destination node on at least one of the plurality of electrically separate channels. For example, and without limitation: The **Huawei Wi-Fi Products** incorporate a mobile ad hoc network comprising source nodes that select a route to the destination node on at least one of the plurality of electrically separate channels. For example, and without limitation: *See* claim element 1[d] above. The **Huawei Zigbee Products** incorporate a mobile ad hoc network comprising source nodes that select a route to the destination node on at least one of the plurality of electrically separate channels. For example, and without limitation: "If a coordinator receives the orphan notification command, the MLME shall send the MLME.ORPHAN.indication primitive, as described in 6.2.7.1, to the next higher layer. The next higher layer should then search its device list for the device indicated by the primitive. If the next higher layer finds a record of the device, it should send a coordinator realignment command to the orphaned device using the MLME.ORPHAN.response primitive, as described in 6.2.7.2 . . ." IEEE Std 802.15.4-2011, at p. 27. "ZigBee router: an IEEE 802.15.4 FFD participating in a ZigBee network, which is not the ZigBee coordinator but may act as an IEEE 802.15.4 coordinator within its personal operating space, that is capable of ***routing messages between devices*** and supporting associations." ZigBee Alliance, ZigBee Specification, Version r21 (Aug. 5, 2015), at 11.

'426 PATENT CLAIM 8	**INFRINGEMENT BY HUAWEI CORPORATION**
	"The responsibilities of the ZigBee NWK layer shall include mechanisms used to join and leave a network, to apply security to frames and to ***route frames to their intended destinations***. In addition, the ***discovery and maintenance of routes*** between devices devolve to the NWK layer. Also the discovery of one-hop neighbors and the storing of pertinent neighbor information are done at the NWK layer. The NWK layer of a ZigBee coordinator (see 'Network topology') is responsible for starting a new network, when appropriate, and assigning addresses to newly associated devices." ZigBee Alliance, ZigBee Specification, Version r06 (June 27, 2005), at 17-18.

'426 PATENT CLAIM 8	INFRINGEMENT BY HUAWEI CORPORATION
	 2.5.2.4 Network Manager This function shall implement the ZigBee Coordinator, ZigBee Router, or ZigBee End Device logical device types according to configuration settings established either via a programmed application or during installation. If the device type is a ZigBee Router or ZigBee End Device, this function shall provide the ability to select an existing PAN to join and implement procedures which permit the device to rejoin if network communication is lost. If the device type is a ZigBee Coordinator or ZigBee Router, this function shall provide the ability to select an unused channel for creation of a new PAN. Note that it is possible to deploy a network without a device pre-designated as ZigBee Coordinator where the first Full Function Device (FFD) activated assumes the role of ZigBee Coordinator. The following description covers processing addressed by Network Management: • Permits specification of a channel list for network scan procedures. Default is to specify use of all channels in the selected band of operation. • Manages network scan procedures to determine neighboring networks and the identity of their ZigBee coordinators and routers. • Permits selection of a channel to start a PAN (ZigBee Coordinator) or selection of an existing PAN to join (ZigBee Router or ZigBee End Device). • Supports orphaning and extended procedures to rejoin the network, including support for intra_PAN portability. • May support direct join. For ZigBee Coordinators and ZigBee Routers, a local version of direct join may be supported to enable the device to join via the orphaning or rejoin procedures. ZigBee Alliance, ZigBee Specification, Version r21 (Aug. 5, 2015), at 189.

'426 PATENT CLAIM 8	**INFRINGEMENT BY HUAWEI CORPORATION**
	 ZigBee Alliance, ZigBee Specification, Version r21 (Aug. 5, 2015), at 325, Figure 3.43; *see also* ZigBee Alliance, ZigBee Specification, Version r06 (June 27, 2005), at 224, Figure 54.

'426 PATENT CLAIM 9	**INFRINGEMENT BY HUAWEI CORPORATION**
9. A method according to claim 8 further comprising, at each intermediate node, determining whether the intermediate node can support the route requested and, if so, forwarding the route request to one of other intermediate nodes and the destination node.	The Huawei '426 Patent Accused Products infringe this claim. *See* claim element 1[b] above.

'426 PATENT CLAIM 10	**INFRINGEMENT BY HUAWEI CORPORATION**
10. A method according to claim 8 further comprising, at the destination node, upon receiving the route request, generating a reply to the source node for each discovered route.	The Huawei '426 Patent Accused Products infringe this claim. *See* claim element 1[c] above.

'426 PATENT CLAIM 11	**INFRINGEMENT BY HUAWEI CORPORATION**
11. A method according to claim 10 wherein generating the reply to the source node for each discovered route comprises sending the reply back to the source node along the discovered route in reverse.	The Huawei '426 Patent Accused Products infringe this claim. *See* Claim 4 above.

'426 PATENT CLAIM 12	**INFRINGEMENT BY HUAWEI CORPORATION**
12. A method according to claim 8 further comprising, at the source node, sending a transmission to the destination node along the selected route.	The Huawei '426 Patent Accused Products infringe this claim. *See* claim element 1[e] above.

'426 PATENT CLAIM 13	**INFRINGEMENT BY HUAWEI CORPORATION**
13. A method according to claim 8 wherein the source node sends the route request	The Huawei '426 Patent Accused Products infringe this claim. *See* Claim 2 above.

'426 PATENT CLAIM 13	**INFRINGEMENT BY HUAWEI CORPORATION**
over each of the plurality of channels sequentially.	

'426 PATENT CLAIM 14	**INFRINGEMENT BY HUAWEI CORPORATION**
14. A method according to claim 8 wherein the route request includes a source node channel identifier.	The Huawei '426 Patent Accused Products infringe this claim. *See* Claim 2 above.

'426 PATENT CLAIM 15	**INFRINGEMENT BY HUAWEI CORPORATION**
15. A method according to claim 8 further comprising, at the source node, prioritizing discovered routes.	The Huawei '426 Patent Accused Products infringe this claim. *See* Claim 5 above.

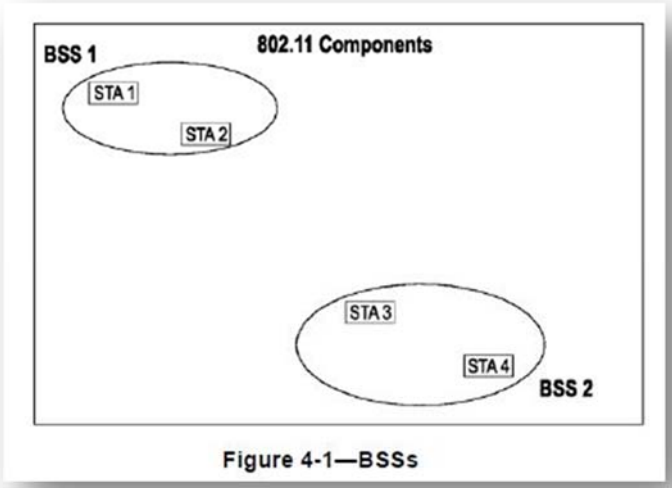
'426 PATENT CLAIM 16	**INFRINGEMENT BY HUAWEI CORPORATION**
16. A method according to claim 15 wherein prioritizing	The Huawei '426 Patent Accused Products infringe this claim. *See* Claim 6 above.

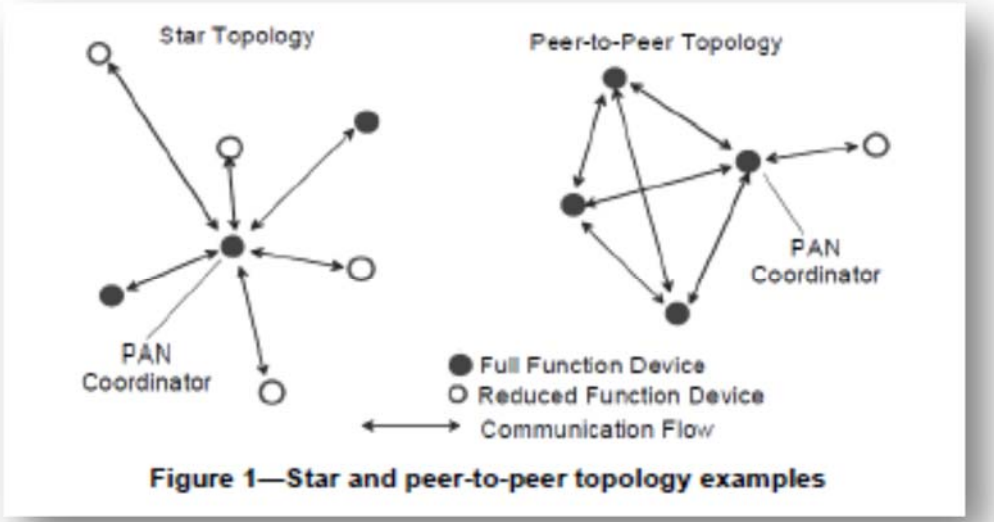
'426 PATENT CLAIM 16	**INFRINGEMENT BY HUAWEI CORPORATION**
comprises calculating a metric for each discovered route to the destination node, the metric being based upon at least one of available bandwidth, error rate, end-to-end delay, end-to-end delay variation, hop count, expected path durability, and priority.	

'426 PATENT CLAIM 17	**INFRINGEMENT BY HUAWEI CORPORATION**
17. A method according to claim 8 wherein a selected route to the destination node includes more than one of the plurality of channels.	The Huawei '426 Patent Accused Products infringe this claim. *See* Claim 7 above.

'426 PATENT CLAIM 18	**INFRINGEMENT BY HUAWEI CORPORATION**
18. A mobile ad hoc network comprising:	The Huawei '426 Patent Accused Products infringe this claim. *See* Claim 1 and Claim 8 above.

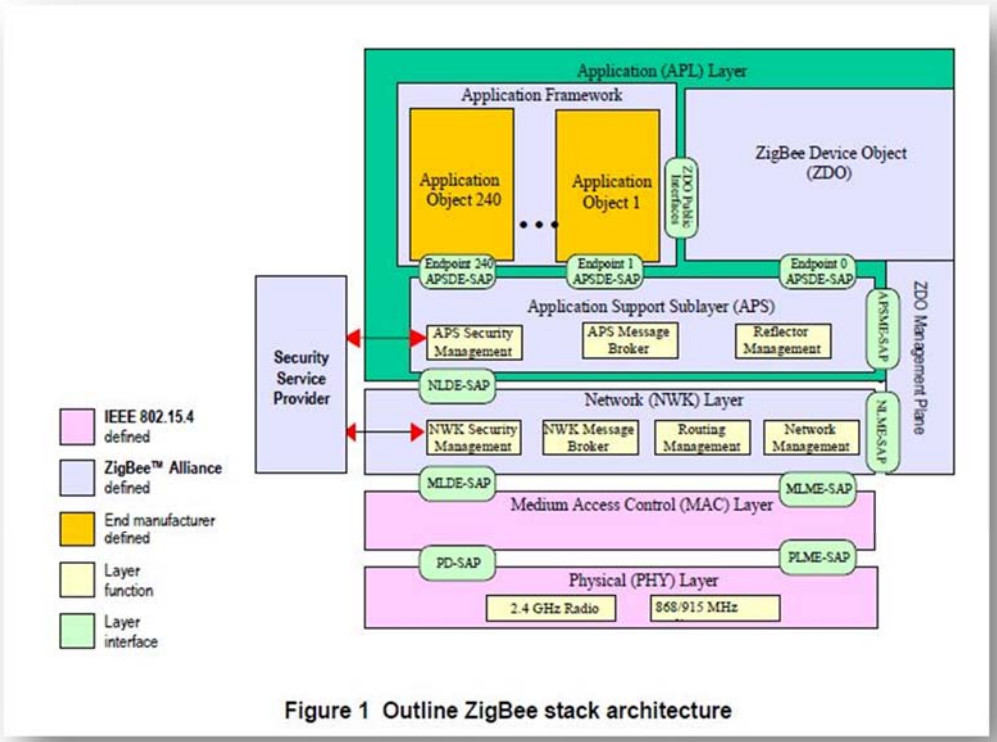
'426 PATENT CLAIM 18	**INFRINGEMENT BY HUAWEI CORPORATION**
[a] a plurality of mobile nodes; and	*See* claim elements 1[preamble] and 8[preamble] above.
[b] a plurality of wireless communication links connecting the plurality of mobile nodes together over a plurality of electrically separate wireless channels;	*See* claim elements 1[preamble] and 8[preamble] above.
[c] each mobile node comprising	*See* claim elements 1[preamble] and 8[preamble] above.
[d] a communications device to wirelessly communicate with other nodes of the plurality of nodes via the wireless communication links, and	The Huawei '426 Patent Accused Products incorporate a communication device to wirelessly communicate with other nodes of the plurality of nodes via the wireless communication links. For example, and without limitation: The **Huawei Wi-Fi Products** incorporate a communication device to wirelessly communicate with other nodes of the plurality of nodes via the wireless communication links. For example, and without limitation: "In the design of wired LANs it is implicitly assumed that an address is equivalent to a physical location. In wireless networks, this is not always the case. ***In IEEE Std 802.11, the addressable unit is a station (STA)***. The term implies no more than the origin or/and destination of a message. Physical and operational characteristics are defined by modifiers that are placed in front of the term STA. For example, in the case of location and mobility, the addressable units are the fixed STA,

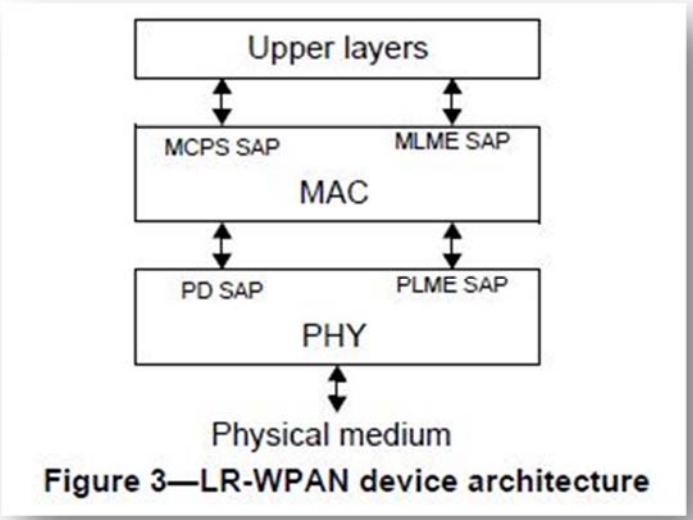
'426 PATENT CLAIM 18	INFRINGEMENT BY HUAWEI CORPORATION
	the portable STA, and the ***mobile STA***. The STA is a message destination, but not (in general) a fixed location." IEEE Std 802.11-2012, at p. 44. "The IEEE 802.11 architecture consists of several components that interact to provide a WLAN that supports STA mobility transparently to upper layers. The basic service set (BSS) is the basic building block of an IEEE 802.11 LAN. Figure 4-1 shows two BSSs, each of which has two ***STAs that are members of the BSS***" IEEE Std 802.11-2012, at p. 45.  Figure 4-1—BSSs

'426 PATENT CLAIM 18	INFRINGEMENT BY HUAWEI CORPORATION
	IEEE Std 802.11-2012, at p. 46, Figure 4-1. The **Huawei Zigbee Products** incorporate a communication device to wirelessly communicate with other nodes of the plurality of nodes via the wireless communication links. For example, and without limitation:  **Figure 1—Star and peer-to-peer topology examples** IEEE Standard for Local and Metropolitan Area Networks – Part 15.4: Low-Rate Wireless Personal Area Networks (LR-WPANs), IEEE Computer Society, IEEE Std 802.15.4-2011, at p. 9, Figure 1. "A system conforming to this standard consists of several components. The most basic is the device. Two or more devices communicating on the same physical channel constitute a WPAN."

'426 PATENT CLAIM 18	**INFRINGEMENT BY HUAWEI CORPORATION**
	IEEE Std 802.15.4-2011, at p. 8.
[e] a controller to route communications via the communications device, and comprising	The Huawei '426 Patent Accused Products incorporate a controller to route communications via the communications device. For example, and without limitation: The **Huawei Wi-Fi Products** incorporate a controller to route communications via the communications device. For example, and without limitation: "Clause 22 specifies the PHY entity for a very high throughput (VHT) orthogonal frequency division multiplexing (OFDM) system. In addition to the requirements in Clause 22, a VHT STA shall be capable of transmitting and receiving PPDUs that are compliant with the mandatory PHY specifications defined in Clause 20. The VHT PHY is based on the HT PHY defined in Clause 20, which in turn is based on the OFDM PHY defined in Clause 18. The VHT PHY extends the maximum number of space-time streams supported to eight and provides support for downlink multi-user (MU) transmissions. A downlink MU transmission supports up to four users with" IEEE Std 802.11ac-2013, at p. 214. "The services provided to the MAC by the VHT PHY consist of the following protocol functions: a) A function that defines a method of mapping the PSDUs into a framing format (PPDU) suitable for sending and receiving PSDUs between two or more STAs.

'426 PATENT CLAIM 18	INFRINGEMENT BY HUAWEI CORPORATION
	b) A function that defines the characteristics and method of transmitting and receiving data through a wireless medium between two or more STAs. Depending on the PPDU format, these STAs support a mixture of VHT: Clause 20 and Clause 18 PHYs." IEEE Std 802.11ac-2013, at p. 215. "The MAC functional description is presented in this clause. The architecture of the MAC sublayer, including the distributed coordination function (DCF), the point coordination function (PCF), the hybrid coordination function (HCF), the mesh coordination function (MCF), and their coexistence in an IEEE 802.11 LAN are introduced in 9.2. These functions are expanded on in 9.3 (DCF), 9.4 (PCF), 9.19 (HCF), and 9.20 (MCF)." IEEE Std 802.11-2012, at p. 818. "Mesh point (MP): a mesh-capable node that uses IEEE 802.11 MAC and physical layer protocols for wireless communication. This node supports automatic topology discovery, automatic route discovery, and data packet forwarding." Huawei, Mesh Technology White Paper, Issue 01, May 10, 2013, at 3 The **Huawei Zigbee Products** incorporate a controller to route communications via the communications device. For example, and without limitation:

'426 PATENT CLAIM 18	INFRINGEMENT BY HUAWEI CORPORATION
	 Figure 1 Outline ZigBee stack architecture ZigBee Alliance, ZigBee Specification, Version r06 (June 27, 2005), at p. 18, Figure 1.

'426 PATENT CLAIM 18	INFRINGEMENT BY HUAWEI CORPORATION
	"An LR-WPAN device comprises . . . a MAC sublayer that provides access to the physical channel for all types of transfer. Figure 3 shows these blocks in a graphical representation, which are described in more detail in 4.4.1 and 4.4.2." IEEE Std 802.15.4-2011, at p. 11.  **Figure 3—LR-WPAN device architecture** IEEE Std 802.15.4-2011, at p. 11, Figure 3.

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5.1 MAC functional description

The MAC sublayer handles all access to the physical radio channel and is responsible for the following tasks:

- Generating network beacons if the device is a coordinator
- Synchronizing to network beacons
- Supporting PAN association and disassociation
- Supporting device security
- Employing the CSMA-CA mechanism for channel access
- Handling and maintaining the GTS mechanism
- Providing a reliable link between two peer MAC entities

IEEE Std 802.15.4-2011, at p. 18.

> "The responsibilities of the ZigBee NWK layer shall include mechanisms used to join and leave a network, to apply security to frames and to ***route frames to their intended destinations***. In addition, the ***discovery and maintenance of routes*** between devices devolve to the NWK layer. Also the discovery of one-hop neighbors and the storing of pertinent neighbor information are done at the NWK layer. The NWK layer of a ZigBee coordinator (see 'Network topology') is responsible for starting a new network, when appropriate, and assigning addresses to newly associated devices"

ZigBee Alliance, ZigBee Specification, Version r06 (June 27, 2005), at 17-18.

'426 PATENT CLAIM 18	**INFRINGEMENT BY HUAWEI CORPORATION**
[f] a route discovery unit to transmit route requests over each of the plurality of electrically separate channels to discover routing to a destination node, and	*See* claim elements 1[a] and 8[a] above.
[g] a route selection unit to select a route to the destination node on at least one of the plurality of electrically separate channels.	*See* claim elements 1[d] and 8[a] above.

'426 PATENT CLAIM 19	**INFRINGEMENT BY HUAWEI CORPORATION**
19. The mobile ad hoc network according to claim 18 wherein the controller further comprises a route request processing unit to determine whether the node can support the route requested and, if so, to forward the route request to	The Huawei '426 Patent Accused Products infringe this claim. *See* claim element 1[b] above.

'426 PATENT CLAIM 19	**INFRINGEMENT BY HUAWEI CORPORATION**
one of other intermediate nodes and the destination node.	

'426 PATENT CLAIM 20	**INFRINGEMENT BY HUAWEI CORPORATION**
20. The mobile ad hoc network according to claim 18 wherein the controller further comprises a reply generator to generate a route reply to a source node for each discovered route.	The Huawei '426 Patent Accused Products infringe this claim. *See* claim element 1[c] above.

'426 PATENT CLAIM 21	**INFRINGEMENT BY HUAWEI CORPORATION**
21. The mobile ad hoc network according to claim 20 wherein generating the route reply to the source node for each discovered route comprises sending the reply	The Huawei '426 Patent Accused Products infringe this claim. *See* Claim 4 above.

'426 PATENT CLAIM 21	**INFRINGEMENT BY HUAWEI CORPORATION**
back to the source node along the discovered route in reverse.	

'426 PATENT CLAIM 22	**INFRINGEMENT BY HUAWEI CORPORATION**
22. The mobile ad hoc network according to claim 18 wherein the controller further comprises a data transmission unit to send a transmission to the destination node along the selected route.	The Huawei '426 Patent Accused Products infringe this claim. *See* claim element 1[e] above.

'426 PATENT CLAIM 23	**INFRINGEMENT BY HUAWEI CORPORATION**
23. The mobile ad hoc network according to claim 18 wherein the route discovery unit sends the route request over each of the plurality of channels sequentially.	The Huawei '426 Patent Accused Products infringe this claim. *See* Claim 2 above.

'426 PATENT CLAIM 24	**INFRINGEMENT BY HUAWEI CORPORATION**
24. The mobile ad hoc network according to claim 18 wherein the route request includes a channel identifier.	The Huawei '426 Patent Accused Products infringe this claim. *See* Claim 3 above.

'426 PATENT CLAIM 25	**INFRINGEMENT BY HUAWEI CORPORATION**
25. The mobile ad hoc network according to claim 18 wherein the controller further comprises a route prioritizing unit to prioritize discovered routes.	The Huawei '426 Patent Accused Products infringe this claim. *See* Claim 5 above.

'426 PATENT CLAIM 26	**INFRINGEMENT BY HUAWEI CORPORATION**
26. The mobile ad hoc network according to claim 25 wherein the prioritizing unit calculates a metric for each discovered route to the destination node, the metric	The Huawei '426 Patent Accused Products infringe this claim. *See* Claim 6 above.

'426 PATENT CLAIM 26	**INFRINGEMENT BY HUAWEI CORPORATION**
being based upon at least one of available bandwidth, error rate, end-to-end delay, end-to-end delay variation, hop count, expected path durability, and priority.	

'426 PATENT CLAIM 27	**INFRINGEMENT BY HUAWEI CORPORATION**
27. The mobile ad hoc network according to claim 18 wherein a selected route to the destination node includes more than one of the plurality of channels.	The Huawei '426 Patent Accused Products infringe this claim. *See* Claim 7 above.